ARCHIVES OF OPHTHALMOLOGY.

A CASE OF METASTATIC CARCINOMA OF ONE OPTIC NERVE, WITH PECULIAR DEGENERATIONS OF BOTH NERVES.

CLINICAL AND PATHOLOGICAL REPORT.[1]

By Dr. WARD A. HOLDEN, New York.

(*With four figures on Text-plate IV.*)

In the past three years valuable contributions to the pathology of the optic nerve have been made, particularly by Druault, Birch-Hirschfeld, and Nuel. We still have much to learn, however, and I wish here to describe a case which seems of importance both clinically and pathologically. Important, first, because it shows that an optic nerve may be destroyed for some distance by a new growth, with complete blindness of four months' duration, yet without the development of pallor of the disc; and, second, because the second nerve in this case shows that an affection of vessels in the pial sheath may cause a limited sclerosis of the nerve, producing a defect in the field of vision.

The *clinical history*, in so far as it bears upon the eye symptoms, was as follows:

S. B., a negress, aged forty-one, married, and without evidences of syphilis, alcoholism, or arterial sclerosis, had the right breast amputated for carcinoma early in 1900. Nov. 7, 1901, she was admitted to the Roosevelt Hospital complaining of persistent vomiting, weakness, and headache. December 6th she was discharged, improved, after treatment of the stomach. Jan. 15, 1902, she was admitted again, on Dr. James's service, with emaciation and weakness, vomiting, continuous severe pain above the left eye, and partial paralysis of the left third nerve.

[1] Read in abridged form before the American Ophthalmological Society, July, 1902.

On examining the eyes at that time, I found the following condition: Left, nearly complete paralysis of all muscles supplied by the third nerve. Left pupil large and reacting to light neither directly nor consensually. No perception of light. Fundus normal.

With the right eye the patient readily counted fingers obliquely across the ward, perhaps forty feet away, and she had noticed no disturbance of vision in this eye. The field was complete for movements of the hand, but for a three *mm* black dot and for pale grays and colors there was a defect, including the infero-nasal quadrant, and encroaching upon the supero-nasal quadrant (Fig. 1, Text-plate IV). The fundus was normal. The pupil reacted directly to light, but not consensually.

The patient stated that the left eye had been totally blind for over a month, and that its vision had been failing slowly for some months before that.

My *diagnosis*, recorded at that time, was: multiple metastatic carcinoma at the base, involving the chiasm or the optic nerves anterior to it. However, realizing that this condition was hopeless, and that the same complexus of ocular symptoms might be produced by gummata of the meninges, I suggested that antisyphilitic treatment be employed, and this was done. But the patient gradually became more emaciated, and died April 11, 1902. Frequent examinations over this period of three months revealed no change in the condition of the eyes. Both discs remained normal and alike, and the expected pallor of the left disc did not appear.

The *autopsy* was made by Dr. Hodenpyl eight hours after death. The pyloric end of the stomach, the lungs, and the liver were found to be studded with small nodules, apparently carcinomatous. I was permitted to remove the brain, optic nerves, and posterior segments of the eyeballs. After taking out the brain there appeared an area of discolored nodular dura, irregularly two *cm* in diameter, about the left optic foramen and sphenoidal fissure (Fig. 2). One nodule involved the left third nerve directly, and another was adherent to the left optic nerve which, at a point one *cm* anterior to the chiasm, was increased to twice its normal thickness. Passing backward from this point, the nerve thinned down to its normal size before entering the chiasm, but, passing for-

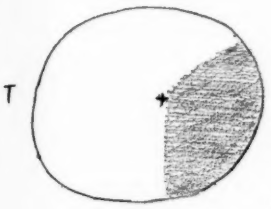


FIG. 1.

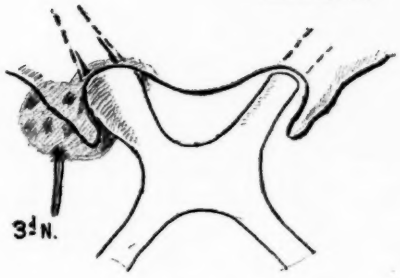


FIG. 2.

FIG. 3.

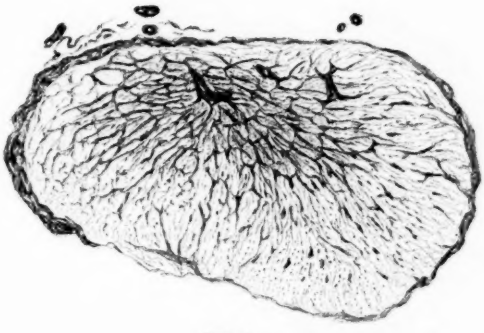


FIG. 4.

ward, a thickening of its sheaths could be followed into the orbit one *cm* beyond the optic foramen.

The right optic nerve was of normal size, shape, and appearance, and had not been involved by the new growths.

Microscopic Examination of the Left Optic Nerve.

The flattened nodules which were scattered over the area of affected dura were found to be carcinomatous foci, which rather rested upon the dura than deeply invaded it. The left optic nerve in its most thickened part was occupied by a carcinomatous growth extending directly from the dura and leaving only a crescentic marginal area, upward and inward, in which any semblance of optic-nerve structure could be found. The invaded interseptal spaces contained only carcinoma cells, with here and there a compact ball of neuroglia (Fig. 3). Passing backward the carcinomatous infiltration gradually became less and ended in a small group of cells lying just beneath the pial sheath, 2 *mm* in front of the chiasm. Passing forward, the carcinomatous infiltration rapidly decreased, but as the nerve passed through the optic foramen and there became invested with its dural sheath, the dural carcinomatous infiltration followed, filling the space between the dural and the pial sheaths for a distance of 1 *cm*, and sending a few tracts of carcinoma cells into the nerve along its septa. In the thickest portion of the nerve, the Weigert stain revealed only a few normal medullated fibres which lay in the uninvaded crescentic nasal portion of the nerve; but farther toward the eyeball, in the chiasm, and in the optic tracts Weigert's method revealed no atrophy. One *cm* behind the eyeball, Marchi's stain, the most subtle test for recent degeneration of the nerve fibres, revealed only a few degenerated fibres in each bundle, according thus with the clinical observation of the absence of pallor of the disc. The ganglion cells of the retina seemed to exhibit no evidences of the degeneration that follows destruction of their axones. In many of the cells the nucleus had migrated to the periphery, but this condition is found in every wasting disease. Sections stained by van Giesen's method showed that in the infiltrated portion of the nerve, in the posterior orbital portion, and back through the chiasm and tracts, the neuroglia tissue, which binds the fibres together into bundles, was greatly increased, without any very marked increase in the connective-tissue septa, except in the tumor mass itself.

In comment, we may recall the fact that after blocking of the central artery of the retina, with degeneration of the ganglion cells and later of the nerve fibres, and in cases of permanent blindness after lesions of the nerve in the orbit, in the optic foramen, or within the cranium, the fibres of the optic nerve degenerate sufficiently to cause pallor of the disc, as a rule, not later than from three to six weeks. The present case proves, however, that with the nerve almost totally destroyed over a considerable longitudinal area total blindness may exist for four months without the disc becoming pale, or any but the slightest microscopic changes being found in the nerve near the ball.

The cause of the blindness in the left eye was apparent at the autopsy, but the cause of the defect in the infero-nasal portion of the field of the right eye was puzzling; hence the right nerve was examined with care and serial sections were made of several segments of it. Happily some of these sections were found to contain what was evidently the primary lesion, permitting a rational explanation of the clinical symptoms.

Microscopic Examination of the Right Optic Nerve.

The ganglion cells in both lateral halves of the retina were alike, and the optic nerve near the ball exhibited no signs of degeneration either with the Weigert or the Marchi stain. But about 6 *mm* anterior to the chiasm a large vessel passed from the pial sheath into the upper portion of the nerve. This vessel, like other smaller ones in this portion of the sheath and nerve, had thickened walls and an increase of nuclei in and about the outer tunic, while the lumen was slightly narrowed. In this region much new connective tissue in delicate strands had developed within the bundles of the upper portion of the nerve, as was shown by van Giesen's stain, and there was an excessive amount of neuroglia—in fine, a sclerosis of the upper portion of the nerve (Fig. 4). Weigert's method revealed the degeneration of a few fibres at this point. This sclerosis extended some distance forward and also back through the chiasm, but in the latter localities it was more diffuse and the increase in connective tissue was rather in the original septa than within the fibre bundles. The

neuroglia was increased in both nerves, but the hyperplasia of connective tissue was more marked in this right nerve.

In advanced sclerosis of the optic nerve the medullated fibres are wanting, the neuroglia is increased, at least at first, the connective-tissue septa are hypertrophied, and the vessels have thickened walls and a narrow lumen. Formerly it was believed that the process consisted in a primary hyperplasia of the interstitial or supporting connective-tissue elements, which then secondarily by pressure destroyed the parenchymatous or nervous elements. Uhthoff sought in this way to explain the degeneration in tobacco-alcohol amblyopia.

Our ideas of sclerosis of the organs in general have changed. The present view in regard to the optic nerve is that sclerosis usually means a primary breaking down of the nerve fibres from any cause, followed by a compensatory hyperplasia of neuroglia. Later the nutrient vessels, after the loss of the tissues which it was their chief function to nourish, become degenerated. Thus the blood supply of the connective-tissue septa becomes diminished and in consequence the septa first grow thicker and later shrink. This process has been studied by Nuel in experimental amblyopia from male fern and his observations have been confirmed by Birch-Hirschfeld.

On the other hand, we know that, as in other organs, changes in nutrient vessels here also may bring about both the parenchymatous degeneration and the interstitial sclerosis. In this way the condition of this right optic nerve is to be explained. With the general carcinomatous metastases, some vessels running to the pial sheath of the nerve had doubtless been interfered with, and the disturbance of circulation caused a slight degeneration of the nerve fibres and a marked increase in connective tissue and neuroglia. No other explanation seems plausible.

As regards the effect of vascular disease on vision, we know that hardened vessels of the circle of Willis about the chiasm and hardened ophthalmic arteries, which run beneath the optic nerves, may by pressure cause atrophy; but it

would seem that we must now go further and recognize that disturbances in the pial vessels may by affecting the nutrition of the optic nerve lead to sclerosis of the nerve and defects in the field of vision. And in this way some of the obscure atrophies of the optic nerve may find an explanation.[1]

In conclusion I wish to express my obligations to Dr. James and to Dr. Hodenpyl, and particularly to Dr. van Giesen for his frequent and valuable suggestions while the pathological work was being carried out in the laboratory under his direction at the New York Infirmary for Women and Children.

Explanation of Figures on Text-plate IV.

Fig. 1.—The relative defect in the infero-nasal portion of the right field.

Fig. 2.—A reconstructed diagram of the chiasm and of the nerves as seen from above. The shaded area represents the infiltrated dura mater with many carcinomatous nodules, one involving the third nerve.

Fig. 3.—The left optic nerve in its thickest portion. The dural carcinoma has invaded the greater portion of the nerve. In this portion only the septa remain, with carcinoma cells and occasional balls of neuroglia tissue between them. In the remaining portion of the nerve many nerve fibres are degenerated. Van Giesen stain.

Fig. 4.—The right optic nerve 6 *mm* anterior to the chiasm. Large vessels with infiltrated outer tunics are seen in the upper portion of the nerve, and about them new tracts of connective tissue have developed within the nerve-fibre bundles, and the neuroglia is increased. Van Giesen stain.

[1] The paper by Siegrist (*Arch. f. Augenheilk.*, xliv., Ergänzungsheft), in which he describes a great number of limited degenerations of the fibres of the optic nerve, will not be discussed here, because the writer is not convinced that many of the conditions which Siegrist describes and pictures are not artefacts. They have to the writer the appearance of changes brought about by too much manipulation of the optic nerves before hardening. To obtain reliable results in preparations of medullated fibres, it is advised, in the case of the Marchi stain at least, that the nerves be left untouched in the body for a number of hours after death and then removed with great care. Siegrist, replying to previous criticisms that his conditions were probably post-mortem ones, says that they cannot be post-mortem because most of the nerves were removed in life. This fact, however, the more favors the probability of the changes being artificial, due to traction, torsion, and compression of the fresh nerves.

THE PURELY ANATOMICAL PROOF OF THE EXISTENCE OF UNCROSSED OPTIC-NERVE FIBRES IN MAN.

By Prof. St. BERNHEIMER, Innsbruck.

(*With Plate XI. of Vol. XL., German Edition.*)

Translated by Dr. Ward A. Holden.

IN 1889 I published in these ARCHIVES the results of my embryological and pathological investigations, continued over many years, concerning the crossing of the optic nerve in man.

In that paper the partial crossing of the optic nerves was proved by a new method—the study of the development of the medullary substance in the fœtus. The proof was obtained only when the uncrossed fibres which had not become fully medullated were examined in continuous serial sections. Only one who had studied the unbroken series of sections through the chiasm, or put faith in my descriptions, could convince himself of the undoubted existence of countless uncrossed fibres in the human chiasm.

In these examinations I was able to show that the uncrossed fibres run chiefly in the upper half of the chiasm. In the tract and in part in the chiasm they are mingled with the crossed optic-nerve fibres, and only beyond the chiasm do the two varieties separate, so that the crossed and uncrossed fibres run side by side to the eyeball. It was found, further, that in horizontal sections an uncrossed bundle could never be followed *uninterruptedly* to the optic nerve of the same side. The study of all my preparations showed that the uncrossed fibres did not run accurately in a plane,

but frequently curved to the side or upward or downward, so that it was necessary to follow single bundles through a series of consecutive sections.

In the lower half of the chiasm the type of complete crossing predominated, but even there it was not possible to follow in one section a crossed fibre uninterruptedly. Only the general picture suggested total crossing, and in continuous serial sections it was possible to follow the crossed bundles accurately, as it was in the upper half to follow the uncrossed.

In that same paper I published a careful report of the study of a case of unilateral optic-nerve atrophy with illustrations.

The conditions in this case corresponded exactly to those found in the earlier embryological studies. On Plate I. (vol. xx., Germ. ed.), Figure 1 represents a section of the lower ventral half of the chiasm stained by Weigert's method. This preparation suggests total crossing, and atrophic fibres are seen in the opposite tract alone. The picture agrees in its smallest details with Michel's, also from the lower half of the chiasm, which he presents in his monograph (*Sehnerven-Kreuzung und Degeneration*, Bergmann, 1887), and uses as a proof of the total crossing of all optic-nerve fibres.

In my Figure 2, however, is represented a section from the upper dorsal half of the chiasm in this same case. Here one sees in the crossed tract few, if any, atrophic fibres, while in the entire length of the tract on the same side numerous atrophic fibres appear.

In 1896, Kölliker, in his epoch-making *Gewebe-Lehre des Menschen*, section 168, again awakened the question of semidecussation, which for thirty years had been considered settled as regards the human chiasm, except possibly by Michel. He said: "I place the greatest importance upon the anatomical proof and believe, though not with absolute certainty, that the centripetal fibres arising from the retinas cross completely in man, the dog, cat, and rabbit. . . . And he that claims that there exists a considerable uncrossed bundle must demonstrate it anatomically, for no

physiological hypothesis and no experiment will be conclusive."

Now, partly through chance, the opportunity is given me of demonstrating uncrossed fibres running in one preparation uninterruptedly from the tract to the nerve of the same side.

The fact that the optic-nerve fibres in their long course do not always lie in the same plane, but bend to the side or up or down, has rendered it impossible hitherto to follow fibres and bundles for a distance in an unbroken course in sections that were thin. Hence we have no anatomical drawings of uncrossed fibres running in a single section. And even the anatomical drawings of the crossed fibres, chiefly after Kölliker (Fig. 680, p. 565, *l. c.*), are in reality only schematic representations of the impression gained from a series of sections.

Through the kindness of Professors Fuchs and Toldt I have come into possession of the eyes and brain of a child with bilateral microphthalmus. The examination of the brain, which is not yet complete, shows that the medullary formation at many points is less advanced than usual at that age, and furthermore the medullation was irregular and, even in the paired nerves, unequal on the two sides. It was, therefore, to be expected that the visual tracts would present irregularities, particularly since the development of the eyes was imperfect, and this proved to be the case.

The chiasm hardened in Müller's fluid-formol was cut in horizontal sections in the usual way, and stained by Weigert's method. The direction of the sections was a little oblique, so that the two lateral halves of the chiasm did not quite correspond. All the horizontal sections are poor in medullary substance, but under a high power the naked axis cylinders can be followed well. The sections through the ventral half of the chiasm and the more dorsal sections of the right half are particularly poor in medullary substance. However, the few medullated bundles in the sections of the lower half of the chiasm, on the whole, take an uncrossed course.

The medullated fibres have a very delicate medullary sheath, and appear as individual fibres completely isolated.

In twenty sections through the upper half of the chiasm

the interesting fact was noticed, that in the right half of the chiasm very few medullated fibres are to be seen, and in many sections none at all. The direction of the sections tended to the right, and downward posteriorly.

In the left half of the chiasm, as seen in these twenty dorsal sections, on the contrary, completely isolated bundles of fibres can be seen (Fig. 1, Pl. XI.), which are composed of individual fibres and can be followed for long distances.

These bundles, with their delicate fibres running almost parallel, passed deep downward and inward from the left tract, and through the chiasm parallel to its lateral margin, far into the optic nerve.

In the tract single fibres of the most lateral of these bundles could be followed backward almost to the point where the tract meets the peduncle, and forward in the nerve of the same side almost to the optic foramen.

Here, in consequence of peculiar, irregular, and non-uniform development of medullary substance, and of a slight obliquity of section, we find a considerable number of isolated, fully medullated bundles of fibres, which may be followed uninterruptedly in one and the same section as bundles and individual fibres, from the left tract to the optic nerve of the same side.

This is the first purely anatomical proof of the existence of uncrossed fibres, and with this the question is ultimately settled, in the strictest anatomical sense, in favor of semi-decussation.

Explanation of the Figure on Plate XI.

A slightly oblique, horizontal section through the upper half of the chiasm of an infant ten days old, with bilateral microphthalmus.

The medullated fibres are unequally developed. In many sections through the upper half of the chiasm there are in the left half, as in the drawing, a large number of bundles of delicately medullated fibres. These are fibre bundles which in their natural isolation can be followed from the deepest portion of the left tract to the left optic nerve as uncrossed bundles. Weigert stain. Zeiss A. 2.

A CASE OF ABNORMAL TORTUOUSNESS OF THE RETINAL VESSELS.

By Dr. HUGO LEVIN, Assistant.
(from dr. gutmann's clinic in berlin.)

(*With Plate XIII. of Vol. XXXVIII., German Edition.*)

Abridged Translation by Dr. Ward A. Holden.

In a previous volume of these Archives Gloor described an interesting case of abnormal tortuousness of the retinal veins in both eyes. I am now able to report a similar case, with some essential points of difference, which is of interest in many respects. The clinical history is as follows:

Miss X, aged eighteen, came to the clinic March 7th complaining of poor vision.

She stated that her sight had been weak since childhood and had gradually grown worse in the course of years. There had never been any sudden diminution in vision. Otherwise she had had no trouble with the eyes. There is no hereditary morbid tendency. Her father and nine other children are healthy, her mother died in childbirth. The patient suffered from rhachitis in childhood, but otherwise has been healthy. For three years she has complained at times of headache and a feeling of pressure in the eyes, particularly after long-continued work near by.

Status præsens: A moderately well-nourished, rather pale girl with evidences of rhachitis—particularly changes in the bones. The glands in the neck enlarged, the teeth notched. The internal organs, particularly the heart, entirely healthy. Examination of the blood showed hæmoglobin 80%, and the ratio of white corpuscles to red was 1:460. The red corpuscles formed rouleaux,

and there were found neither microcytes nor poikilocytes. The blood, therefore, was entirely normal.

The right eye, apart from hyperopia of 6 D, is normal.

Left eye: Externally normal; in the centre of the cornea a linear opacity beginning in the upper third and extending to the lower margin. Anterior chamber of normal depth; iris, lens, and vitreous normal. Pupil round and responsive. Ophthalmoscopic examination shows a uniformly red disc with indistinct outline, except outward and below. At the nasal margin are indications of radial striation. Hyperopia of 7 D. The retinal vessels, both arteries and veins, are markedly tortuous. A short distance from the point of emergence the main branches divide and their twigs at once take on a corkscrew-like form, which may be followed out into the periphery. At many points the vessels cross and form great recurrent arcs and loops; particularly the superior temporal vein passes in a great curve to the lower half of the retina, passing over numerous tortuous vessels and even the twigs from the inferior temporal vein. The curved vessels lie everywhere in one plane. The calibre of the veins, compared with that of those in the right eye, is greatly increased, while the arteries are rather narrow. Besides this, the vessels exhibit no abnormalities, they are nowhere interrupted, they can be followed in their entire length, and the reflex lines, particularly from the veins, are broad. On the whole, one obtains the impression that the vessels are actually increased in number, and particularly in the region of the disc there are numerous small tortuous vessels which are wanting in the right eye. The macula is normal.

Intraocular tension and field of vision are both normal. R v = $\frac{6}{60}$. With + 1.25 v = $\frac{6}{24}$. L v = $\frac{6}{60}$; with + 2, $\frac{6}{24}$?; no improvement with cylinders.

Better than any description, the figure on Plate XIII. shows the peculiar conditions of the vessels. The comparison with a head of Medusa is suggested, and the appearance of this network of crossing tortuous vessels was indeed astonishing.

No vessel of straight normal course was to be found and the more carefully the fundus was studied the more fine tortuous vessels were revealed.

In the literature there are few reports of similar conditions and these were collected by Gloor in his paper. In

the text-books it is frequently mentioned that in normal conditions the retinal vessels may assume a tortuous course.

In Magnus's ophthalmoscopic atlas there is a plate called "Varicosities of the Retinal Veins," which resembles our case in so far as the course of the veins is concerned, but the arteries are as usual, and the eye is otherwise pathological in that retinal hemorrhages are found.

Galezowski (*Traité iconogr. d'opht.*) pictures a case of pronounced tortuousness of the retinal veins seen in a patient with mitral insufficiency. In this case there were no other changes in the fundus, and it resembled our case in that the number of visible venous vessels seemed to be greatly increased; the arteries in this case also were normal. The cause of the abnormal course of the vessels was the venous stasis caused by the mitral insufficiency, and the abnormality had therefore a significance differing totally from that in our case in which the person was entirely healthy.

Frost (*The Fundus Oculi*, p. 55) pictures a similar tortuousness of the retinal vessels.

The greatest similarity to our case is seen in Plate VI. of Oeller's atlas. This was drawn from a highly hyperopic but otherwise normal eye, and shows pronounced tortuousness of the arteries as well as the veins, but particularly of the veins. Oeller calls this condition "tortuositas vasorum"; in his case, unlike ours, both eyes were affected. On Plate VII. is shown an extraordinary tortuousness of the veins which the author observed in a case of leucæmia.

Gloor's case differs from ours in important particulars. The veins only were tortuous, and both eyes were affected. Furthermore the tortuousness of the vessels was not altogether of the same character as that in our case. It was not so pronounced, the large veins being affected only partially, and the more marked changes being in the finer twigs. Near the disc the vessels were normal. The small vessels running to the macula were not curved and the number of the vessels was not greatly increased. In our case, however, the formation of convolutes, resembling the rete mirabile of the kidneys, was wanting. Two cases reported by Elschnig, (*Zehender's klin. Monatsbl.*, 1898, p. 55) show great similarity

to Gloor's case and differ from ours in their rich anastomoses.

The three cases form, as Elschnig rightly remarked, a particular category hitherto undescribed, yet I believe with Gloor that their pathological significance is to be considered far from uniform.

In order to judge this case in its etiological and clinical relations, it is necessary to remember that the patient was young and healthy and that the eyes were highly hyperopic but clinically otherwise normal. It would appear most rational, therefore, to regard the peculiar tortuousness of the retinal vessels of the left eye as a congenital anomaly of no pathological significance. At first glance the case seemed to us to be one of optic neuritis, the blurring of the margin of the disc, even in the absence of hemorrhages, or exudations in the retina, favoring this diagnosis, but a further examination convinced us that the case really belonged in the category of pseudo-neuritis. Nottbeck (*Graefe's Archiv*, xliv., p. 31) has recently considered this subject in a comprehensive paper in which he discusses the cases reported.

He calls attention anew to the well-known fact that there is a congenital anomaly of the optic nerve which ophthalmoscopically presents the picture of optic neuritis although no inflammatory process really exists. A blurring of the disc exists with hyperopia of high degree. Bristowe (*Ophth. Review*, 1891, p. 321), examining 125 cases of hyperopia, found it in 23.2%, and designates the condition "hyperopic disc." Uhthoff (Heidelberg Ophth. Soc., 1883) suggest that in these cases the blurring of the margin of the disc is due to a congenital lack of transparency of the nerve-fibre layer at its entrance into the eye. According to Landolt, it is due to a defect in the nervous apparatus, developmental faults accounting for both the cloudiness of the disc and the tortuousness of the vessels. Loring believed that the blurring of the margin of the disc was caused by the development of new tissue in the disc, and Greeff in a similar way explained the physiological clouding of the retina which leads to blurring of the margin of the disc particularly on its nasal side.

The pseudo-neuritis is characterized by the fact that re-

peated observations after long periods of time reveal no changes either in the appearance of the disc or in the function of the eye; this is a criterion of a congenital anomaly.

In our case there is no evidence that the affection was an acquired one. The diminution in vision was due to the refractive error, and the acuteness of vision in this eye was as great as in the other eye, which had a normal fundus. Furthermore, repeated functional examination revealed no change.

Elschnig's case was regarded as a primary affection of the retinal vessels, but his patient was seventy years old and had arteriosclerosis, so that the case in no way comes into the same category as ours. The same may be said of the cases reported by Samelsohn (*Klin. Monatsbl. f. Augenheilk.*, xi., p. 214) and by Jacobi (*ibid.*, xii., p. 255). In Samelsohn's case there was a partial tortuousness of the vessels with the formation of anastomoses in a man of forty-nine who presented signs of general venous stasis. Samelsohn believed that there had been a degeneration of the veins in the retina analogous to the formation of hemorrhoidal veins. Jacobi's cases, in which there was partial tortuousness of the vessels, were all in old people who in part exhibited changes in the vitreous and other pathological appearances in the fundus.

Samelsohn's case and one of Jacobi's are characterized by the fact that there was a true new-formation of retinal vessels. In this respect they differ from our case in which the apparent richness in the vessels is due only to the distension of existing vessels whereby many otherwise too small to be seen become visible.

While in the eye there are no signs that would account for the development of this anomaly, there are also no general causes discoverable which might lead to such a condition. Arteriosclerosis is out of the question in a girl of eighteen, no affection of the heart was found as in Galezowski's case, and the blood shows no changes as in Oeller's case.

Coming by exclusion to the conclusion that our case represents a congenital anomaly, the excessive hyperopia existing is a further proof of this idea. A low degree of

tortuousness of the retinal vessels is not rare in hyperopia and even high degrees are seen without any other abnormalities. This "hyperopic disc" has been thought to be due to the overstraining of the accommodation, and while this may be considered doubtful, it is nevertheless true that evident hyperæmia of the discs and slight blurrings of the disc margins and cloudiness of the adjacent retina may disappear after correcting glasses are put on. In our case such an explanation would not hold good since with an equal amount of hyperopia in the two eyes only one exhibits the vascular anomaly.

In my opinion, the marked tortuousness of the retinal vessels which is observed chiefly in cases of hyperopia stands in connection with the latter in so far as both result from the same cause—a malformation, but the tortuousness is not directly dependent upon the hyperopia. This is probably true also of the pseudo-neuritis which is observed chiefly in hyperopia. Occasionally the anomaly of refraction may be wanting while the tortuousness of the vessels or the blurring of the discs is present. Such a case was Gloor's.

Various explanations have been suggested to account for this abnormal condition of the vessels. It has been referred to a congestion at some period of fœtal life. Landolt suggested that the small size of the hyperopic eyeball did not allow the vessels to stretch out to their full length, but this seems hardly plausible in our case since only one eye was affected, while the hyperopia was equal in the two eyes. Frost believes that the retina may remain in its early folded state and thus the vessels remain tortuous, but no sign of the folds is found in such cases. I would suggest another possibility, viz., an abnormal development of the vessels themselves, particularly a lack of development of their elastic elements whereby a tortuousness of the vessels would be brought about. This of course must remain merely a supposition until microscopic examinations are made.

In conclusion I would again call attention to what I consider the clinical significances of the case reported. It is a fact, not new but insufficiently regarded, that in hyperopia

there is a congenital anomaly of the course of the vessels consisting in a marked tortuousness. In the majority of cases this tortuousness is slight or only indicated, but it may attain as high a degree as in our case without acquiring any pathological significance, even when a simultaneous congenital blurring of the margins of the discs gives rise to the picture of optic neuritis.

ON THE HISTOLOGY OF THE SCARS FOLLOWING POSTERIOR SCLEROTOMY.[1]

By Dr. J. MELLER, Clinical Assistant.

Translated by Dr. Ward A. Holden.

MANY authors, and particularly de Wecker, have believed that the efficacy of sclerotomy in cases of increased tension consisted in the development of a peculiar permeable scar—a filtration scar. They have assumed that a permanent current was established from the interior of the eye out through the scar, not only in consequence of a persistent thinning of the coats of the eye in the region of the scar, but also through an incomplete union of the trabeculæ of the scleral wall and the development of a loose intercalated tissue.

A résumé of the literature on the subject appears in the paper by Andogsky and Selansky.

Investigations on posterior sclerotomy were undertaken by Tobler (these Archives, xxx., ii., 148), and in his paper a résumé of the literature on posterior sclerotomy is to be found. He limited himself, however, in his experiments on rabbits to the question of the preference of meridional or equatorial sclerotomy. He believed that the closure of the sclerotomy wound in rabbits was complete as early as the eighth day, but made no experiments in regard to filtration.

All authors, however, are united in believing that the results of sclerotomy frequently are of short duration. One often observes that at a time when the scleral wound has not yet closed and long before it has fully cicatrized, the

[1] From Professor Fuchs's clinic in Vienna.

effect of sclerotomy has already passed and tension has risen again; whence we must conclude that the effect of sclerotomy depends not only on the possibility of the coats of the eye permitting the exit of liquids, but particularly also upon the degree in which the vitreous is able to give off liquids.

An interesting case in this respect was reported by Terrien (*Arch. d'opht.*, 1899, p. 691). After an anterior and two posterior sclerotomies had been made with but transitory result, a fresh increase in tension and great pain, eighteen days after the first posterior sclerotomy, necessitated enucleation. Terrien found to his surprise when the eye was examined that there was a wide breach of continuity in the sclera at the site of the first puncture. There had been no cicatrization, the choroid and retina were retracted, and vitreous protruded through the lips of the scleral wound. Terrien, therefore, did not agree with those that proposed to resect a piece of sclera in order to prolong the effect of sclerotomy, since, as his case showed, the factor which caused a sclerotomy to be unsuccessful lies not in the non-closure of the wound, but in a pathological condition of the vitreous.

An observation by Professor Fuchs should be mentioned here. He has informed me that he has repeatedly seen after posterior sclerotomy a bead of vitreous appear beneath the conjunctiva, and some days later become as hard as cartilage, while the tension rose again.

Kästner (*Inaug. Dissert.*, June, 1898) reported a similar case. Posterior sclerotomy had been done on an eye with absolute glaucoma. Later at the point of incision a hard conical ridge, projecting several millimetres high, appeared beneath the conjunctiva. It was not possible to determine whether or not this was a beginning ectasia of the scleral scar, but the fact that it had developed while the tension was low spoke against the idea of ectasia. The tension remained low until eleven days after the operation, when it rose again and the eye was enucleated.

Histological examination revealed a fairly broad gaping wound. Outside of the wound was a large bead of vitreous surrounded by new connective tissue and undergoing organ-

ization, so that the whole mass appeared as a dense deposit upon the sclera. Here the newly developed connective tissue about the protruding vitreous served to block the wound.

I wish now to report two cases put at my disposal by Professor Fuchs.

Case 1.—S. H., aged sixty-six. Two weeks before, the right eye became painful suddenly and vision was completely lost. The eye became reddened. The physician summoned prescribed atropine. Previously the patient had had good vision, and had never noticed haziness or haloes about a light.

St. pr.—Right eye: anterior ciliary veins dilated, circumcorneal injection, cornea dull, anterior chamber of normal depth, iris atrophic; pupil oval, medium-sized, unresponsive; a greenish reflex from the interior, T + 3, V = p. l., no projection. The disc excavated in its entirety, a narrow crescent outward.

Diagnosis.—Acute glaucoma.

An iridectomy was made, but it did not diminish the tension, and ten days later posterior sclerotomy was done.

The following day, however, the tension was high again, and two days later optico-ciliary neurotomy was done and the patient discharged ten days later. The cornea was dull and insensible, the anterior chamber shallow, tension low. Three months later severe attacks of pain necessitated enucleation. The chamber was obliterated and the ball stony hard.

I shall describe only the sclerotomy scar as it appeared in sections cut across it. On the whole the scleral scar is not very evident, being indicated only by a narrow tract of nuclei, when viewed under a low power. When more highly magnified the details may be studied more accurately. The scar is broadest in the outer layers of the sclera, then becomes narrower in the middle layers, and again becomes broader in the most internal portion of the sclera. At the site of the scar the episclera is somewhat prominent, and it is pervaded with dilated blood-vessels. In the outer bundles of the scleral fibres one sees that near the scar the bundles begin to separate and then cease altogether, while in their place the scar tissue is seen, composed of a delicate ground-substance and numerous nuclei. It has extended somewhat in among the ruptured bundles, forcing them apart.

Farther inward the granulation tissue became narrower so rapidly that in the middle layers only a narrow stripe of isolated nuclei and traces of red blood corpuscles indicate the course of the scar, and the previous solution of continuity in the scleral fibres is suggested only by a slight irregularity in the interlacing of the fibres.

In the inner layers the scar tissue is more evident. Blood-vessels appear here, and the scar passes over without a line of demarcation into the choroidal scar.

The choroidal scar is much more extensive than the scleral scar. In transverse section it appears as a tough fibrous nodule, in which first the lamellæ of the supra-choroidea are imbedded. The scar lies in fact under the choroid, so that the latter is separated by it from the sclera. The cut margins of the choroid cannot longer be distinguished, but the choroid passes over on each side into the scar tissue. The cells of the pigment epithelium become, toward the scar, poorer in pigment, and finally disappear completely where the scar begins, as does also the membrana vitrea.

With the choroidal scar is intimately connected that of the retina. The two cut edges of the retina have retracted from each other, and the interval is filled with young cellular scar tissue, into which the two nuclear layers of the retina pass over. Internal to this denser tissue is a looser tissue with many new vessels, which forms a nodule projecting into the vitreous and overhanging the retina somewhat on each side. Internal to this is a thin sheet of blood.

The scar in the choroid and retina is much more extensive than that in the sclera, as shown by the fact that it appears in many more sections than does the other. This is to be explained by supposing a retraction of the choroid and retina, producing a large gap, to be filled with granulations, while the edges of the scleral wound lie in apposition.

This case resembles Terrien's in that a short time after a sclerotomy tension rose while the wound was still open and allowing the passage of a current of liquid. Of course, the scar which formed later rendered filtration impossible.

This does not support de Wecker's opinion that the development of a filtration scar is caused by increased tension.

In our case the scar became very dense under the increased tension.

Case 2.—S. S., aged fifty-five. Came to the clinic April 22, 1892, stating that he had been struck on the right eye six months before, and recently he had noticed that his vision was poor, the lower portion of objects being indistinct.

Right eye, externally normal, media clear, retina in its entire lower half detached and elevated in the form of two vesicles. The limiting line lies in the horizontal meridian. Of the disc one sees only the upper margin. The detached retina is gray. Fingers are counted before the eye. Tn.

April 23d, a posterior sclerotomy was made downward with a Graefe knife. A yellowish liquid escaped from the wound. The peripheric portions of the retina, though still hazy, appear reddish, and lie upon the choroid.

At some distance from the lower periphery there is a projecting detachment with a sharp outline, whose upper limit corresponds with that of the previous detachment. The surface is nodular. One suspected the presence of a cyst or tumor. V = fingers at $1\frac{1}{2}$ *m*. November 5th, the patient returned. For two months the eye has been entirely blind. November 3d, for the first time severe pains began.

St. pr.—Chemosis, cornea dull, chamber shallow, iris discolored green, pupil dilated. T + 2. A greenish reflex is obtained from the interior. Light perception at 1 *m*.

November 6th, enucleation. There was found a very vascular sarcoma occupying the posterior portion of the choroid and surrounding the disc.

The ball was cut in sagittal sections. The scar in the sclera is quite similar to that described in the preceding case. Slightly magnified, the scar appears as a narrow stripe of nuclei breaking the continuity of the scleral fibres. The union of the edges of the scleral wound is so complete that only under a high power can one discover changes in the structure of the sclera (see figure). Under a high power, individual bundles are seen to become thin, and end in a point in the region of the scar, or, very much narrowed, pass through the scar to mingle with the bundles on the other side. Only in the innermost layers of the sclera has there

been formed true scar tissue in a narrow zone. The scleral bundles of both sides pass into it without coming into direct contact. This scar tissue has pushed in some distance meridionally among the scleral bundles, forcing them apart. The nuclei of the latter are more numerous near the scar, and in the narrow processes of scleral fibres within the scar, the nuclei often lie close together in rows. A small vessel passes obliquely through the scar.

The scar in the choroid was detached from the sclera in the course of preparation, the lamellæ of the suprachoroidea being split up.

The margin of the choroidal wound is fairly sharp, that of the pigment epithelium less so. At this place a dense connective-tissue scar appears, into which the degenerated retina sinks.

In this case also the margins of the choroidal and retinal wound have retracted, and they were united by scar tissue, while the margins of the scleral wound were in apposition and united without the intervention of scar tissue.

This marked retraction of the choroid and retina about the incision was observed by Tobler in rabbits' eyes, and Terrien found it in a human eye, as was stated above.

There can be no question of filtration through the scars described. In the first case the scar was three months old, in the second six months old. The older a scar, the denser it is and the less permeable. Andogsky and Selensky found in their experiments on rabbits that scleral scars were permeable in the beginning only, and they assumed the same to be the case in men. Our histological examination has fully confirmed their assumption.

My thanks are due to Professor Fuchs for his friendly assistance in this work.

THE RÔLE OF SCLERAL SCARS IN OPERATIONS FOR GLAUCOMA.[1]

By Dr. N. ANDOGSKY and Dr. P. SELENSKY,
St. Petersburg.

Translated by Dr. Ward A. Holden.

IN the sixties, de Wecker, Stellwag, and others, believing that scleral section alone was sufficient to relieve the tension in glaucoma, introduced into ophthalmology sclerotomy to take the place of iridectomy.

This operation was recommended by some writers for all cases of glaucoma, but most ophthalmologists held other views as to its indications and its efficacy. This difference of opinion is based upon the experience of the operators themselves and also upon theoretical considerations in regard to the nature of the operation.

The chief advocate of sclerotomy, de Wecker, called the cicatrices formed after the operation filtration scars, since he believed that the scar was a thin spot in the sclera which readily allowed the aqueous humor to filter through it and extend beneath the conjunctiva. Such scars, he believed, could form only in glaucomatous eyes under the influence of high tension. Later de Wecker laid particular stress upon the incomplete union of the trabeculæ of the scar tissue as explaining the development of the filtration scar. Thus arose the so-called filtration theory of the action of sclerotomy.

Stellwag believed that the cutting through of the sclera and the relief of its tension, particularly of its outer layers

[1] Experimental investigations from the laboratory of Prof. Bellarminoff.

which were united again by soft intercalated tissue, was the chief factor in the result of sclerotomy.

Kries followed de Wecker, and Quaglino agreed rather with Stellwag.

Schmidt-Rimpler maintained on the ground of microscopic examinations that the intercalated tissue developing when the scleral section was very peripheric was less compact than the original tissue.

Schweigger, on the contrary, said: "Even when the section is as peripheric as possible only a small portion of the wound lies in the sclera; the far greater part lies in the cornea and such wounds heal normally, as I have convinced myself by anatomical investigation, not by the disposition of an intercalated new tissue but by immediate union. In general, cicatrices are not held to be weakened parts, but more resistant than normal tissues.

Among the more recent writers, Czermak believes that the establishment of an entirely new channel of exit by sclerotomy, while the old remained closed, has not been demonstrated and is highly improbable. In his opinion, typical sclerotomy with a purely scleral section can cure glaucoma only when the adherent iris and ligamentum pectinatum are cut through and thus the normal channels of exit kept open. He decidedly opposes de Wecker's filtration theory.

Priestley Smith believes that in some cases the result of operations for glaucoma depends upon the development of a permanent sclero-corneal fistula through which the aqueous humor may pass directly beneath the conjunctiva.

Lange, who described two cases of sclerotomy with good and lasting results, believes that a permanent filtration of aqueous through the scar tissue is possible. In both of his cases, years after the operation episcleral œdema was observed in the region of the scar. It would seem here that fistulæ had developed in the scars.

Snellen, who believes that sclerotomy is indicated in all cases of increased tension, ascribes to the scleral scar the property of restoring the disturbed lymph circulation of the eye, but he is not certain as to the manner in which this is accomplished.

According to Logetschnikoff, the filtration theory is unproven.

Dohnberg, following de Wecker, would explain the results of sclerotomy as being due to the development of a filtration scar.

Maklakoff believes that the scar found after sclerotomy is composed of a loose tissue through which filtration is possible.

Bellarminoff finds that filtration may take place for a short time. Within the first two or three weeks after a successful sclerotomy has been done, he has observed a slight subconjunctival œdema and diminution of intraocular tension; later the œdema passes off and tension frequently becomes increased again. In his clinic, sclerotomy is done rarely and then only when for some reason iridectomy is not practicable.

Panas places sclerotomy in the middle of the series of operations for glaucoma, between the conventional iridectomy and repeated paracentesis of the cornea.

Schoeler was the first to study the possibility of filtration experimentally, using rabbits, and he took the negative side of the question. He believed that sclerotomy in glaucoma acted merely like a paracentesis of equal extent.

Tobler, in his experimental investigation as to equatorial and meridional sections in posterior sclerotomy in rabbits, found that a current from the interior of the eye passed through the wound for about eight days and that then the wound closed. Experiments with injections of India ink to test the permeability of the wounds later were not undertaken.

Glancing briefly through the literature in this way, we find that many writers have accepted de Wecker's "permeability of scleral scars," while others have rejected it. Therefore, we have endeavored to decide the question by experimental means.

In order to demonstrate the fact that scleral scars take part in the removal of the aqueous humor, there are two methods at our disposal — a quantitative and a qualitative. In the first, Leber's manometer is used to compare the rapidity of filtration of the aqueous in normal eyes and in eyes on

which sclerotomy has been done. The other method, used by Schoeler, consists in artificially increasing the tension to 100 *mm* Hg above the normal in healthy and in sclerotomized eyes and noting the time required for the restoration of normal tension.

Schoeler studied rabbits' eyes that had some time previously been sclerotomized from one to five times. A manometer was used and a Leber canula introduced into the anterior chamber. A weak salt solution was injected and the experiment lasted twenty-five minutes. In none of the experiments did Schoeler find an increased rapidity of filtration in the operated eye, and when several sclerotomies had been made filtration was rather delayed.

We believe, however, that it is not necessary to determine quantitatively the filtration of the aqueous. In sclerotomies on rabbits and other animals, the course of healing is almost always complicated by partial or total adhesions of the iris which depend upon anatomical peculiarities. Often the existence of these adhesions can only be discovered with the microscope. These adhesions may greatly diminish the excretions of aqueous along the natural channels, and this, in our opinion, was probably the reason for Schoeler's negative results.

It seemed to us therefore advisable to study the permeability of scleral scars microscopically and microchemically.

We made sclerotomies on a number of rabbits with the Graefe knife or a lance with and without excision of a portion of the iris. The lids were sutured for some days and eserine was instilled in order to prevent adhesions. After a period of from 8 to 145 days after the operation, injections into the anterior chamber were made either of 5 % citrate of iron or of India-ink emulsion that had been filtered several times. A funnel containing the injection was placed 41–45 *cm* above the rabbit. From the funnel a rubber tube passed down and branched so that two Leber canulas could be attached. One of these was inserted in a horizontal direction into each anterior chamber of the rabbit. The experiments usually lasted thirty minutes, then the canulas were removed, the rabbits killed with chloroform, and the eyes

carefully enucleated. Hardening in formol 4%, celloidin imbedding, serial sections. In case citrate of iron had been injected the Berlin-blue reaction was first obtained in the usual way with ferrocyanide of potassium or by Quinke's sulphate-of-ammonia method. After-staining was done with borax- or alum-carmine.

The injection was done under a pressure equal to 30–33 *mm* Hg., which is some millimetres higher than the normal intraocular tension in rabbits. This was sufficient to assure us that the current passed from the canula into the anterior chamber and not in the contrary direction. It did not seem to us advisable to use the high pressure employed by Schoeler.

De Wecker believes that every scar which can be called a filtration scar develops only under high pressure. It seems to us, however, that when the sclerotomy scar has properties on which the success of the operation depends these properties have nothing to do with increased or pathological tension. The increased tension is the essential feature of glaucoma which we wish to relieve by operation. When a sclerotomy is made on a glaucomatous eye, the aqueous readily escapes through the gaping wound; but if the intraocular tension does not sink, then how can it sink later when the beginning cicatrization of the wound prevents the free outflow and at most can only permit filtration? Let us assume that after completion of the scleral section the escape of aqueous has reduced tension at least to the normal. For the first few hours or days the aqueous has an artificial channel of exit; and if the tension still remains normal we might suppose that an advantageous filtration scar was developing. If, however, the tension rises soon after the operation, the glaucoma is not relieved; although the scar in this case develops under increased tension, its characteristics are not to be taken into account, and there is no question of remedial effect as regards such a scar. From this it follows that remedial filtration scars, if they exist, must arise under a tension that is near the normal, and they must possess permeability under this tension.

The results of our experiments show that under certain

conditions the scars following sclero-corneal sections influence the excretion of aqueous humor in that for a time the current is accelerated in the region of the scars. This was shown not only by the clinical picture after injections of India ink, but by microscopic examinations.

Before passing to a description of the changes observed in the region of the scars, we shall describe the passage of aqueous through the normal channels of exit as shown by our experiments with injections of citrate of iron and India ink. The sections were always cut perpendicular to the scleral scar. When citrate of iron had been injected, the solution was carried out through Fontana's spaces and the circumvascular lymph system of Schlemm's canal and other venous twigs, as was shown by the bluish discoloration of these parts. From the circumvascular lymph system the iron was absorbed by the blood currents. The contents of Schlemm's canal and of the larger blood-vessels of the sclero-corneal region were colored an intense bluish green, while the vessels of the other ocular coats, which were not concerned in the carrying-off of the aqueous, gave with the ferro-cyanide test only a slight greenish-blue color due to the hæmosiderin normally present in the blood. Attention was paid only to a finely granular coloration of the tissues, a slight diffuse coloring being regarded always as due to imperfections in technique. A similar condition was found in eyes into which India ink had been injected. In normal eyes no pigment was found in the subconjunctival (episcleral) space.

As for the parts adjacent to scleral scars, when citrate of iron had been injected, under certain conditions, chief of which was the age of the scar, we found an intense granular blue coloring of the circumvascular spaces of the scar and sclero-corneal region and a diffuse blue coloring of the contents of the blood-vessels. Besides this there was a granular deposition of Berlin blue among the connective-tissue fibres and cells of the scar, at times through its entire thickness out to the epithelium, and, finally, a number of granules, in part free in part within leucocytes, in the subconjunctival space near the scar, in the form of tracts parallel to the surface of the

scar. When India ink was injected the same deposition of black granules was found as in the other cases.

This shows then that the contents of the anterior chamber may pass through scleral scars, being absorbed in part by the lymph and blood systems, and in part passing through the substance of the scar into the episcleral space. The latter way is to be regarded as an artificial one, not existing in the normal state.

Clinically this is confirmed by observing that after India ink is injected into a sclerotomized eye an œdema, marked with black, appears in the subconjunctival tissue and the scar itself becomes intensely black. Microscopically it can be shown in such cases that no actual fistula exists.

It might be supposed, since pigment granules were found within leucocytes in the subconjunctival space, that the pigment had been carried from the anterior chamber by a migration of leucocytes, but the time was too short for such migration to occur and no other evidences of migration were observed.

The permeability depended greatly upon the age of the scar. When 8–14 days old, the passage of pigment was very evident; when 21–40 days old, but little pigment was found in the scar and in the subcutaneous tissue; and when 40–145 days old, no trace of filtration could be discovered.

As stated above, the influence of adhesions of the iris to the scar must be taken into account in rabbits. Usually such anterior synechiæ are found in rabbits. If they are partial they may not have much influence, but if total they would prevent the aqueous humor from gaining access to the scar and to the natural passages as well.

Our experiments were not numerous enough to enable us to draw conclusions as to the effect of the method of operation — de Wecker's sclerotomy, simple sclerotomy with division of the conjunctiva, and that with preservation of a conjunctival flap — upon the properties of the scar. All scars had in common the formation of intercalary tissue, although the quantity differed in different cases. Small scars were observed, and more extensive ones, and at times scars of cystoid structure due to the inclusion of iris tissue. The

broad and loose scars contained more pigment than the narrow and dense ones.

Our conclusions, therefore, are that scleral scars possess a certain permeability at a particular stage of their development, but not in the degree claimed by the adherents of the filtration-scar theory.

Although the results of experiments on animals cannot be considered as holding good absolutely for man, we have no reason to deny the permeability of fresh scleral scars in man when the margins of the wound become united through intercalated tissue, as is frequently the case when sclerotomies are made with the Graefe knife. As to the length of time that scleral scars in man may remain permeable, we can only suppose that they cannot remain permeable much longer than scleral scars in rabbits.

It has not yet been shown by pathological examination that sclerotomy in man opens the natural channels of exit, as has been claimed on the ground that it divides the trabecular tissue of the chamber angle and the wall of Schlemm's canal. But in the rabbit, when the sclerotomy section partly passes through trabecular tissue, which is relatively poorly developed in the rabbit, and partly through the adjacent sclero-corneal junction, we were unable to find any perceptible difference in the character of the scars.

The fact that the scars in glaucomatous eyes form in eyes with increased tension, and not as in our experiment in eyes with normal tension, does not, as stated above, concern us. The only means of providing a direct artificial channel of exit, conveying aqueous humor into the subconjunctival space for an extended time or permanently, as de Wecker, Lange, and others have found clinically in several cases, lies in the development of a permanent sclero-corneal fistula, which is more likely to occur after an iridectomy with incarceration than after a properly performed sclerotomy.

The establishment of the fact that fresh scleral scars in their normal course of healing are for a time permeable is of value in determining the worth of sclerotomy in glaucoma. We can say that a sclerotomy done in a glaucomatous eye is not to be regarded as a simple puncture of the sclera

as some of its opponents have done. There is no doubt but that it forms a new artificial channel of exit for the aqueous, if only for a limited time, and that in this way in many cases of glaucoma, in which the periphery of the iris rests upon the cornea but is not yet adherent, a restoration of normal tension may be brought about and with the use of myotics the chamber angle and its filtration channels opened again. On the other hand, we find in the short duration of the permeability of the scar a simple explanation of the fact recognized by most authors that the therapeutic effect of a sclerotomy is much inferior to that of a regularly performed iridectomy — the latter operation possessing all the positive advantages of a sclero-corneal scar, and also all the advantages of a radical removal of the checks to the outflow of aqueous through the normal passages in the region of the coloboma.

The truth, therefore, appears to lie midway between the claims of the advocates and the objections of the opponents of sclerotomy. The matter is further complicated, however, by the fact that the anatomical conditions vary in different cases, and that the technique of operation and cause of recovery are not always the same. Thus an explanation of the favorable or unfavorable results of the operation upon clinical grounds alone is not sufficient, but pathological researches that might make the matter clearer are found, in the literature, concerning iridectomy only.

In conclusion, we must devote a few words to the anatomical basis of the curative effect of the recently proposed incision of the chamber angle (sclérotomie interne of de Wecker, incisione dell' angolo irideo of de Vincentiis, and debridement de l'angle iridien of Valude and Duclos). The anatomical investigations of Valude and Duclos on dead eyes have shown that in all these operative procedures the needle of Valude or the Graefe knife made sometimes a more or less oblique incision into the scleral wall of the chamber angle, and sometimes an incision into the actual chamber angle, with detachment of the insertion of the ciliary muscle from the inner surface of the sclera and opening of the suprachoroidal space. These are the effects of the operation on non-glaucomatous eyes. In glaucomatous eyes with adhesion

of the periphery of the iris to the sclera, it is highly probable that besides all these changes the periphery of the iris is cut into in almost every case. Since in many cases the immediate effect of the incision of the chamber angle consists chiefly in the incision of the sclera, we may conclude that for a time after the operation the aqueous humor readily passes into the lymph spaces of the sclero-corneal region, and to the circumvascular lymphatic system of the scleral venous plexus. It is, however, questionable whether such an incision of the sclera will gape continually. If it cicatrizes like every other scleral wound, we are justified in believing that the fresh vascular scar tissue at first offers no obstacle to the passage of the aqueous, as we found in true sclerotomy. A time must come, however, when the scar tissue, in consequence of contraction and degeneration of its vessels, will lose its permeability. Let us suppose that in another series of cases the incision opens the suprachoroidal space. Although this space in normal conditions plays but a small rôle in carrying off the aqueous humor, if an open communication exists between it and the anterior chamber, and the aqueous is not properly carried off through normal channels, it may assume the principal rôle until cicatrization takes place.

From what has been said it is evident that incision of the chamber angle, like sclerotomy, is to be regarded as an operation which for a short time provides an artificial channel of exit for the aqueous humor, and probably exercises only an indirect influence upon the restoration of the normal channels. In cases in which the anatomical changes at the chamber angle consist only in the apposition of the root of the iris to the wall of Schlemm's canal, this increased outflow by reducing tension may restore the normal balance of secretion and outflow, and myotics may open the normal channels again in the entire extent of the chamber angle, whereby a more or less permanent cure may be obtained. There is always danger in such cases of injuring the passages so that cicatrization later may obliterate them. In other cases, however, with complete blocking of the natural channels of outlet, the effect of the operation, even when most favorable, is limited to a transient diminution of tension without any alteration of the anatomical basis of the disease.

ACUTENESS OF VISION AND ASTIGMATISM.

By Dr. ADOLF STEIGER, Zurich.

Abridged Translation from *Archiv f. Augenheilkunde*, Vol. XLIV., 1901, by Dr. Ward A. Holden.

DIMINUTION of vision was formerly believed to be the most characteristic or even the only sign of astigmatism—that anomaly of refraction which in respect to its frequency and importance was so long underrated. But for a number of years we have recognized how frequently asthenopia and other symptoms are dependent upon this corneal error. By learning that accommodative asthenopia depends not only upon hyperopia, as was formerly supposed, but also upon astigmatism, the latter has come to have a nervous significance as well as an optical.

There is much difference of opinion as to the amount of astigmatism that may exist without much diminution of vision below the arbitrary standard, or 1, and also as to the necessity of correcting astigmatism when vision is normal.

Therefore the following investigations have been undertaken with Pflueger's test letters in a closed but well illuminated space.

Acuteness of vision in relation to the different degrees of corneal astigmatism with and without correction by means of cylinders (440 boys).

Variety and degree of the corneal astigmatism.	No subjective astigmatism.	Subjective astigmatism present.			%
	Vision.	Without cyl.	With cyl.	Improvement.	
Perverse.....	—	0.81	1.19	0.38	47
0–0.25 D with rule..	1.32	1.25	1.37	0.12	9½
0.5 D	1.34	1.29	1.40	0.11	8½
0.75 D.....	1.33	1.29	1.36	0.07	5½
1–1.75 D.....	1.29	1.16	1.25	0.12	10
2–3. D.....	—	0.54	0.81	0.37	69
		(0.48)	(0.82)	(0.34)	(71)
> 3. D.....	—	0.36	0.66	0.30	83

From the first heading — no subjective astigmatism — some remarkable facts appear.

1. No single eye with perverse corneal astigmatism lacked subjective astigmatism, although the cases were exclusively of 0.25 D.

2. All eyes with a corneal astigmatism of two or more dioptries were greatly improved with cylindrical glasses.

3. The average acuteness of vision in eyes with corneal astigmatism 0–1.75 was about 1⅛.

The maximum of acuteness of vision is in groups 0.5 and 0.75, and it is almost as great in the 0–0.25 group.

The second portion of the table contains the acuteness of vision, with and without glasses, in all cases in which subjective astigmatism could be found. The following points may be mentioned:

1. A material reduction of vision begins first in group 2–3.

2. The eyes with perverse astigmatism also show a diminution of vision.

3. The maximum of uncorrected vision is more pronounced in the groups 0.5 H. and 0.75 H. astig.

4. The greatest absolute assistance from cylindrical correction is obtained in the perverse cases, and in the cases of high degree.

Twenty-nine of the total number of eyes had a corneal astigmatism of 2. D or more. These were divided into the following categories:

Astig. hyp. compd. 0, Astig. hyp. simpl. 1,
Astig. mixtus 12,
Astig. myop. simpl. 9, Astig. myop. compd. 2.

The predominance of myopic form is due to the prevalence of spherical myopia at these ages, and to the fact that atropine was not used, which might have rendered many of them hyperopic.

The relation between vision and variety of astigmatism was as follows:

Variety of astigmatism.	Average astigmatism.	VISION.		
		Uncorrected.	Corrected.	Improvem't.
Ast. h. s.....	+ 2.	0.40	0.50	0.10
" mixt..... ...	2.77	0.50	0.85	0.35
" m. s.....	— 2.72	0.52	0.92	0.40
" m. c.....	— 3.	0.57 [1]	0.81	0.24

This shows that the ast. m. s. is best corrected, the mixed somewhat less completely, and the ast. m. c. least of all.

The cases of unilateral astigmatism of high degree were six, with an average H. H. ast. of 2.5 D.

The vision without correction was 0.43,
with " 0.67.
The increase 0.24.

That is, the eyes are not only not much improved; but uncorrected, the vision is very poor, even though the astigmatism has the comparatively low average of 2.5.

This much for the boys. The conditions among five hundred girls of the same school grades was quite similar. Thus far forty-one eyes, with corneal astigmatism of 2. D or more, V = 0.43 and 0.77, or an improvement of 0.34, which is exactly that obtained with the boys. The fact that the average vision is somewhat less depends upon the higher average of the corneal astigmatism, which has been observed for years in girls examined in the schools of Zurich.

Uncorrected and corrected vision in the different forms of astigmatism.

Variety of astigmatism.	No. of eyes.	Average corneal astigmatism.	VISION.		
			Uncorrected.	Corrected.	Improvem't.
Hyp. compd.....	4	2.8 D	0.42	0.81	0.39
Hyp. simpl.....	3	3.8 D	0.37	0.72	0.35
Mixt.....	15	3.8 D	0.44	0.79	0.35
My. simpl.....	9	3.0 D	0.41	0.91	0.5
My. compd.....	10	3.1 D	0.43	0.63	0.2

Here also the improvement with cylinders is greatest in astig. m. s., and least in m. c. But both the average of

[1] After correction of the spherical ametropia.

absolute vision and of the amount of improvement with glasses of every sort should be taken into account.

Besides these average values some characteristic examples may not be without interest.

	Eye.	Corneal astig.	Axis.	Subj. astig.	Axis.	Vision, with and without cyl.		Improvement.
1. Great significance of perverse astigmatism of low degree.								
a) F. M...	R.	0.25 D	|	+ 0.75	—	0.75	1.25	67 %
	L.	1.00 D	—	+ 0.5	|	1.25	1.38	10 %
b) No. 256	R.	0.25 D	|	− 0.75	|	0.75	1.38	84 %
2. Good vision with and without correction of marked astigmatism.								
a) A. M..	R.	2.5 D	75° N	+ 0.5 − 1.5	15° T 75° N	1.	1.25	25 %
b) No. 431	L.	4.00 D	—	+ 1.5 − 2.5	— |	0.75	1.25	25 %
3. Equal vision with unequal astigmatism.								
No. 525..	R.	1.00 D	—	+0.5	|	|	1.25	25 %
	L.	2.5 D	—	+0.75 D − 1.25 D	| —	1.	1.25	25 %
4. Poor vision of the corrected and uncorrected only astigmatic eye.								
No. 408..	R.	0.75 D	—	—	Emmetr.	0.25	1.25	
	L.	2.25 D	—	−2.5	—		0.75	
5. Very good correction of only astigmatic eye.								
a) R. M...	L.	2.25 D	70° N	+ 1.5 D − 1. D	20° T 70° N	0.3	1.	233 %
b) A. J....	R.	0.5 D	Myopia				1.25	
	L.	2.75 D	80° N	− 3. D	70° T	0.45	1.25	178 %

In the last case we would call attention to the marked improvement in vision, notwithstanding the fact that the axes were oblique, which in our experience is rare in the young. The exercise and preservation of function in the left eye is doubtless partly due to the fact that the right eye was myopic and had diminished vision, so that the errors of refraction being uncorrected the astigmatic eye was most used in distant vision.

From the preceding we may draw the following conclusions:

1. Perverse astigmatism, even when of low degree, reduces vision greatly and correction causes marked improvement.

Correction is the more indicated since in this form asthenopia is most frequent and most pronounced.

2. The lower and middle degrees of corneal astigmatism up to 1.75 D permit in the young good vision, which usually can be improved by correction, but correction is less often required on account of diminution of vision than on account of asthenopia.

3. The higher degrees of astigmatism, 2 D or more, cause usually a diminution of vision to $\frac{1}{3}$ or $\frac{1}{2}$ and frequently with the best correction vision is not improved beyond the moderate average 1. Here the correction is indicated, not only on account of the asthenopia, but also on account of the diminution of vision. It is not wise to leave uncorrected an eye with poor vision at the age when myopia threatens. In a later publication we shall discuss the important relation between astigmatism and myopia.

4. Patients with unilateral astigmatism have rather poorer vision than those with bilateral astigmatism of the same degree and are less readily corrected. The question whether the one eye should be corrected or not in such cases depends upon the condition of the other eye, the age, calling, and presence or absence of asthenopia. In general a strong astigmatic glass before one eye is not well borne when the other is normal.

A few remarks may be added as to the investigations of other writers. Pfalz in his reports takes into consideration only cases of 0.75 D or more of astigmatism. But we know that lower degrees often cause asthenopia, and no degree of astigmatism is to be regarded as normal when without its correction asthenopia or chronic conjunctivitis persists.

Roth, on the contrary, finds that very low degrees must be considered. He was struck by the frequency with which persons with no corneal astigmatism and a subjective perverse astigmatism required correction with cylinders in order to bring the vision up to normal. With this observation I fully agree.

No one will maintain that a person with vision 1 cannot perform or is not fitted for most occupations, although frequently better vision would be desirable. The difficulty lies

often not in the diminution of vision, for there may be momentary good vision without the power to maintain it. When vision by a trivial error is reduced from 1.4 to 0.9 the faulty course of the rays is evidently not the only although the primary cause.

Practical experience forces us more and more to the belief that in the interior of the eye, whether in the posterior surface of the cornea, or in the form of the lens, or in their functional adaptation, or from other causes, an astigmatism according to the rule is much more readily compensated for than a perverse astigmatism, and that in perverse astigmatism the subjective amount is greater than the objective.

It was shown above that corrected vision in cases of perverse astigmatism frequently is not so good as in cases of astigmatism according to the rule under 1.75 D. Simon, however, gives tables to show that vision is better in the perverse form, but his error lies in the fact that he has not compared cases of equal degree of the two varieties.

Roth found that 12.5 % of his astigmatic patients did not obtain better vision with cylinders. Among these were many children and persons with squint, nystagmus, and the like—cases which are difficult to judge of. According to my experience, cases of uncomplicated astigmatism of high degree were almost without exception improved by the correction.

As stated above, I obtained the best vision in simple myopic astigmatism and the poorest in the compound myopic form; the mixed and the hyperopic took the middle position as regards both the vision eventually obtained and the improvement produced by the cylinder.

Naturally one might suppose that in a given eye the fundamental refraction is emmetropic, and then a too flat horizontal meridian caused hyperopic astigmatism and a too flat vertical meridian myopic astigmatism, but in fact the matter is not so simple, and from the nature of the astigmatism we can draw no conclusions as to the pathological meridian.

ENDARTERITIS OBLITERANS ARTERIÆ CENTRALIS RETINÆ DIFFUSA.

By Dr. J. MARKOW, Charcow, Russia.

Abridged Translation by Dr. Ward A. Holden.

J. K., a peasant of sixty, came to the Charcow eye clinic, October 26, 1897, on account of a sudden disturbance of vision in the left eye.

The external examination of the eyes revealed: horizontal nystagmus, moderate dilatation of the pupil with preserved reaction to light, and a beginning senile cataract in each eye. R V = $\frac{6}{60}$; with − 3.5, $\frac{6}{18}$. L V = $\frac{2}{200}$. The limits of the field of vision for the right eye are: upward 60°, outward 80°, downward 60°, inward 70°; for the left eye the limits were: upward 35°, outward 70°, downward 40°, inward 40°. The tension is normal in each eye. Examined with the ophthalmoscope in the inverted image, the right disc is seen to be pale and small, the arteries rather narrow but not tortuous and without visible alterations, and the veins normal. In the left eye the disc is pale and of the same size as the right. The arteries were at first not visible in the inverted image, the veins are dilated, particularly one running downward, which near the disc is curved spirally, so that one might speak of it as a cirsoid aneurism. The retina is cloudy and œdematous, particularly in the temporal region. The fovea appears as an indistinctly limited cherry-red spot, with its long diameter horizontal. In the erect image the arteries appear as narrow rose-colored stripes without perceptible pulsation when pressure is exerted on the eyeball. This may be due to the fact that the lens in this eye has a well-marked opacity. No stripes or extravasations are visible along the vessels.

The results of a general examination were as follows: the mus-

culature is well developed, body strong, stature high, arterio-sclerosis of the arteries of the extremities and temples, on the left side of the forehead a scar adherent to the underlying bone, and hemorrhoids. The parents of the patient died young, of what diseases is unknown to him. Of his two brothers one is living and has a son, the other died in childhood. Our patient has had no children, although he has been married for forty years. When he was eight years old he had a number of abscesses on his head, which were cured with a salve whose nature is unknown to him. Some time after, a tumor appeared in the region of the scar on the forehead, and the entire face became swollen and the eyes closed. When the tumor opened, much pus escaped and the eyes could be opened again. In later years the patient has suffered from catarrh of the stomach. The nystagmus has existed since childhood, as has also the myopia, which has increased. Vision has been poorer periodically, but has never been so poor as at present. In the summer the patient always suffers from headache, which is the more intense the warmer the weather.

Six days before coming to the clinic, he noticed that he could not see with his left eye, but there was no pain. The first treatment consisted in the application of the Heurteloup to the left temple, after which both eyes were bandaged. Twenty-four hours later an improvement could be detected. The left eye had $V = \frac{5}{200}$, and with -3.5, $\frac{2}{60}$. The field was as before. The narrow arteries could be recognized with the ophthalmoscope, the œdema of the retina was less extensive, and the red spot at the macula was less sharply outlined. There was thus an ischæmia of the retina which had reached such a degree in the left eye that the picture of embolism of the central artery was presented. Such an ischæmia is caused by optic neuritis, embolism, spasmodic contraction of the vessels, and arterio-sclerosis. Since there was no evidence of intraocular neuritis, any existing neuritis must have been retrobulbar, but the normal field, the absence of a scotoma, and finally the lack of subjective signs speak against such a diagnosis. There is therefore no neuritis.

The momentary disturbances of vision could be considered the result of a hemorrhage into the nerve substance, but against this speak two things: the ophthalmoscopic picture in the right eye and the affection of the nerve (the existing pallor would easily be explained by the ischæmia, but it is seen in both eyes).

There is no cause for embolism; the heart and large vessels are

normal. One must remember, nevertheless, that atheromatous changes in the vessels are not always recognizable, so that their absence does not preclude embolism unless other essential signs are wanting.

Since there is no vision remaining in the affected eye, one might think of embolism of a branch of the central artery, but for this diagnosis we have neither the characteristic fundus picture nor the characteristic defect in the field of vision.

As regards an ischæmia due to general causes, such as anæmia, weakness of the heart, and the like, there are in our case no grounds for such a supposition.

It is well-known that spasmodic contraction of the vessels as well as an increase in their elasticity may cause an ischæmia of the retina. The contraction may be produced experimentally, for example by stimulating the medulla oblongata with the electric current. The contraction may be brought about too by an alteration in the constituents of the blood, such as an excess of CO_2, by an overwarming of the blood, by an excess of the products of metabolism, etc. Cases of this sort have been described as being found in various diseases of the nervous system by Raymond, Berger, Keller, Knapp, Alfred Graefe, Ramorino, and Wagenmann (*Graefe's Archiv*, 1897, ii.). Wagenmann's patient, a nervous man, had periodic blurring of vision in the right eye which sometimes increased to complete blindness, when the picture of embolism of the central artery was observed. After long-continued unsuccessful treatment, an iridectomy was done, in consequence of which the patient had such violent attacks of cerebral excitation that he had to be removed to a madhouse. He was released fully cured and the visual disturbances did not recur for a long time. Wagenmann believed that the cause of these spasms was an arterio-sclerosis, he having found white stripes along the retinal vessels with the ophthalmoscope. Other authors believe that such symptoms depend upon neuroses of the vessels representing a general affection, and one which must be treated by attention to the general nervous system.

As regards our patient, we must exclude the vascular contraction described, for the following reasons: (1) the contrac-

tion of the arteries is often accompanied by contraction of the veins; (2) such contraction is observed in nervous persons who suffer from organic nervous diseases; (3) according to Raymond, this is often confounded with the contraction of other vessels; (4) it is associated with weakness of the heart; and finally (5) there results, when it is long continued, a compensatory hypertrophy of the heart. As for the chronic narrowing of the vessels, which is due to an increased elasticity, this is observed exclusively in chlorosis. We must, therefore, assume a local process—that is, the central artery is narrow because an incomplete thrombosis or embolism exists, of which we can find no ophthalmoscopic evidence. At first glance the question interesting us appeared unclear, since we have no pathological examinations of these conditions. But when we enter the field of the general pathology of the vessels, we shall there perhaps find an answer to the question.

We recognize two different diseases of the vessels: endarteritis which is the more frequent, and periarteritis, inflammation, and degeneration of the adventitia, a relatively rare disease.

Usually the disease begins in the intima, and then the media, and finally the adventitia are attacked, so that we have endarteritis, later endomeso-arteritis, and finally simple arterio-sclerosis.

Endarteritis appears as the result of an inflammation with consecutive sclerosis of the intima, or in consequence of a certain degeneration of the latter (amyloid-hyaline metamorphosis). In case the sclerosis is long-continued, the so-called atheromatous degeneration may come on, particularly when all the membranes are involved in the process. Both the sclerosis and the atheromatosis diminish the elasticity of the vessels by which the power of distension of the vessel walls is disturbed. Thoma, the chief investigator of sclerosis of the vessels divides endarteritis into two varieties: nodosa and diffusa. Endarteritis nodosa affects usually the larger vessels and frequently those of the brain; endarteritis diffusa affects the extremities, particularly in the most distal twigs of their arteries.

Thoma believes that the affection of the intima depends upon nutritive disturbances of the muscle membrane whereby the vessel becomes dilated; but the cause may be also the disturbed enervation of the vessel. Such diseases of the vessel walls which are connected with marked thickening of the intima as, for example, endarteritis obliterans, represent, according to Friedländer, a quite particular form of vascular inflammation which, under certain conditions, never passes over into atheromatous degeneration. This form was observed by Heubner in the small vessels and particularly in those at the base of the brain; Gull-Sutton described the same condition in other portions of the body under the name arterio-capillary fibrosis. Finally, analogous changes can be observed after ligation of a particular vessel; microscopic examination then shows a proliferation of the endothelium of the intima and of the intima itself whereby its thickness is considerably increased. Microscopic investigations of symmetrical gangrene of the extremities by Koch, Friedländer, Winiwarter, Valkowitsch, Manteufel, Nikolsky, Lawdowsky, Theodorow, and Weiss, and the investigations regarding the nervous affections in such cases by Rachmaninoff, Murawieff, and Vredensky, showed that the lesion was an endarteritis obliterans accompanied by a degenerative neuritis. The intima in such cases had undergone a hyaline or amyloid degeneration but was never atheromatous even in the region of the necrosing part.

The inflammation and degeneration of the inner membranes of the arteries of the extremities is chiefly observed in cold countries, like Russia. This affection often occurs with syphilis, alcoholism, and diabetes, but still it is entirely unexplained. The smaller arteries of the extremities are attacked, which in consequence of the obliteration become gangrenous. The lower extremities are more frequently attacked since they are relatively less well nourished.

Arteritis obliterans has been observed in connection with syphilis, typhoid fever, and trauma. Vredensky believes that we have to do here with a mixed infection. The latest investigations make it appear probable that the cause of the disease is a degenerative neuritis.

It is clear that our case was one of endarteritis localized in the eyes. (The author here cites earlier pathological investigations which were not convincing, his paper having been written before that of Reimar, published in THESE ARCHIVES xxix., 4, in which endarteritic changes in the retinal vessels are described in great detail.—TRANS.)

In cases of vascular sclerosis, with the ophthalmoscope one sees dilatation of the vessels which are tortuous, localized constrictions and dilatations, and white stripes along the vessels. The first condition indicates sclerosis of the intima and media, the latter indicates secondary or idiopathic periarteritis. When both these forms are combined, as is very possible, one can only speak of a general sclerosis.

With diffuse disease of the intima a uniform narrowing of the vessel results so that in time its lumen may become wholly obliterated; the narrowing then will be recognized by a grayish stripe. The veins are the whole time dilated and tortuous. And the fundus presents a picture of extreme ischæmia of the retina, similar to that seen with embolism of the central artery, if the narrowing is extreme.

When the intima and the media are involved in a diffuse affection, the elasticity of the vessels is lost and the arteries appear dilated and tortuous or even show pulsation, while the veins preserve their normal relations.

To return to the examination of our patient. The ophthalmoscopic picture in the left eye is so identical with that observed with endarteritis that we may make that diagnosis.

The right eye presented the same picture. We had therefore no purely local affection but a general disease of the entire body.

When we recall the nystagmus, the history of hereditary degeneration, and the periodic failure of vision in our patient, we may assume the existence of a symmetrical diffuse endarteritis which, instead of affecting the extremities as is usual, here has affected the retinal vessels.

The sudden loss of vision would appear to be due to embolism rather than endarteritis. The œdema of the retina also favors this view, since a long-continued stenosis of the

central artery would have caused atrophy of the retina. But an incomplete thrombosis of the artery or a spasmodic contraction might give rise to the same symptoms of œdema and sudden loss of sight.

The condition symmetrical in the two eyes—periodic disturbances of function, venous congestion, and narrowing of the retinal arteries—corresponds exactly to the clinical symptoms of endarteritis of the extremities.

The correctness of the diagnosis was confirmed by the following observations in regard to course and therapy. Such means were employed as would secure rest of the eyes and improvement in circulation.

The patient was kept in a dark room and treated with the Heurteloup leech, warm fomentations, galvanization, and inhalations of nitrite of amyl. The dark room had no permanent effect, nor did galvanization. The inhalation of a single drop of nitrite of amyl produced symptoms of intoxication, doubtless because the cerebral arteries were diseased also, and its effect on the eye was not observed.

The patient was therefore treated again as in the beginning. From the left temple a cylinderful of blood was drawn and the patient remained with bandaged eyes for twenty-four hours in a dark room. Two days later the vision of the left eye increased to $\frac{3}{2^{5}}$ with correction of his myopia. The field was complete. The narrowed arteries were clearly seen and were then almost as large as in the other eye. The œdema of the retina was no longer apparent and the red spot at the macula had vanished. Iodide of potassium and salicylate of soda were employed also.

A third application of the Heurteloup cleared up the fundus completely, and the vision was as good as could be expected with the incipient cataract. The veins remained tortuous as before. The patient was discharged with advice as regards diet, and was instructed to continue the iodide and perform only easy work. He returned from time to time for examination, and no evidence of progress of the disease was noted.

Chronic diffuse endarteritis differs from ordinary sclerosis in that there is a uniform narrowing of the arteries and

dilatation of the veins, no white lines along the vessels, and no hemorrhages. When not treated the diseased vessel finally becomes obliterated. With rational treatment of the prodromal symptoms complete recovery is possible, and in cases of long-continued endarteritis, an improvement in vision. It is thus evident that the differentiation between endarteritis and arterio-sclerosis is of great importance as regards treatment and particularly prognosis, the prognosis of arterio-sclerosis being highly unfavorable.

The immediate cause of the complete obliteration of the central artery in the left eye was probably due to a local thickening of the intima, since spasm of the arteries was observed neither in the eyes nor in other parts of our patient's body.

THE TREATMENT OF CORNEAL INFILTRATIONS BY IODINE-VASOGEN.

By Dr. ALEXANDER DUANE, New York.

(*With a text illustration.*)

IN common with others, I have found that the tincture of iodine, while often affording very satisfactory results in the treatment of infiltrated corneal ulcers, usually causes intense pain, often lasting for hours. This seems to occur no matter how carefully the application is made, nor how sedulously we avoid having the tincture come into contact with the palpebral conjunctiva.

Carbolic acid, advised by many as a substitute for the iodine tincture, has in my experience proved equally painful, and, moreover, in two instances at least produced increase of the corneal infiltration and in one marked chemosis. Such a result may have been due to some carelessness in the application, and if so would not constitute an objection to the carbolic acid, provided the latter were decidedly superior to the other remedies employed. This, however, does not appear to be the case, and at the best carbolic acid seems to be no more efficient than the iodine, which, moreover, can be applied very freely without causing any bad effect upon the sound cornea or the conjunctiva.

As a substitute for the tincture of iodine, I have lately used the solution of iodine in vasogen, prepared by the Pearson-Fabrik and imported by Lehn & Fink. This is a non-irritant, syrupy, brownish liquid, containing either 5 per cent. or 10 per cent. of iodine. In all my experiments except the very first, I used the 10 per cent. solution.

This remedy has also, I find, been employed in Europe for the same purpose, but I have not had access to the article describing the results obtained there.

I have used the iodine-vasogen in nineteen cases. Fifteen of these were ulcerations or superficial infiltrates of the cornea. One of these cases was seen but once, so that no conclusions could be drawn from it regarding the effect of the remedy. Another case was also lost sight of after a few days of treatment, but was progressing satisfactorily when last seen. A third case was one of fascicular keratitis, which continued to advance in spite of two applications. The further progress of this case was unknown, as the patient discontinued treatment.

The remaining twelve ulcerative cases were followed from start to finish. They comprised marginal ulcers, central ulcers, including some rather large ulcers of the phlyctenular type in children, as well as cases of deep central ulceration in adults, recurrent ulceration at the site of an old corneal opacity, etc. In all the result was favorable, in that after the first application there was no further extension of the ulcer, and after two or three applications a distinct and continuous retrogression took place, the exudate absorbing, and the ulcer healing promptly.

It is very likely true that in the majority of these cases the disease would have progressed favorably without the application of the remedy; yet I could not avoid the impression that in all it hastened at least, if it did not actually determine, the favorable outcome. But in some cases it did more than this; for example, in the following, in which it succeeded after other remedies had failed, and in which it saved the cornea from what promised to be a pretty thorough-going destruction.

Annie F., aged seventeen, came into my service at the Ophthalmic and Aural Institute on March 13, 1902, having apparently a simple acute conjunctivitis of the left eye, for which she received solution of mercury bichloride, 1:5000. Returned on 22d with several pin-point elevations in the limbus. On the 25th I saw her myself for the first time, and found the palpebral conjunctiva swollen, moderate purulent secretion, three punctate elevations in

the limbus (A, B, C, Fig. 1), and two infiltrated ulcers, D and E, adjoining A and B, but separated from them by clear cornea. Treatment was changed to calomel insufflations, with boric acid, protargol t. i. d., and hot applications.

March 29th. — Worse. Limbus adjoining A dark-red and swollen, and conjunctival injection increased. Carbolic acid (95 per cent.) applied to ulcers and immediately neutralized with a

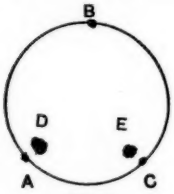


FIG. 1.

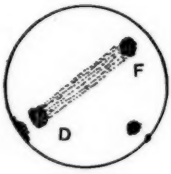


FIG. 2.

FIG. 3.

drop of alcohol applied with a cotton-tipped probe. Unfortunately some acid escaped upon the cornea, making it hazy and causing immediate marked chemosis and intense pain which lasted until the next day. Cold applications made.

April 3d. — Chemosis had continued, and limbus at A appears red and overhanging. Within two days a new infiltrate F (Fig. 2) has developed, connected with D by a faint streak of infiltration.

April 8th. — Has had protargol, boric acid, and atropine with renewal of hot applications and calomel insufflations. Condition has remained the same until within the last twenty-four hours, during which there has developed in the centre of the cornea a dense, purulent-looking mass (Fig. 3) connected with D and also with the inner and lower margins of the cornea by fainter streaks of infiltration.

The condition was evidently one of those rapidly spreading corneal infiltrations springing from an infected ulcer and calculated, if unchecked, to lead to very extensive destruction of the cornea. On account of the situation it was decided not to apply the galvano-cautery.

April 9th.—Status idem. Iodine-vasogen (6 per cent.) applied to the central mass.

April 10th. — Better. No reaction or pain from the iodine.

April 11th. — Application repeated. Central mass smaller.

April 12th. — Mass distinctly smaller.

From this time on there was steady improvement. The iodine-vasogen (first 6 per cent., afterwards 10 per cent.) was applied

first every other day, afterwards every four or five days, until May 8th, when it was replaced by the yellow oxide ointment. The infiltration steadily dwindled, and by the time the iodine was discontinued had practically disappeared. The swelling and succulence of the conjunctiva, with the attendant photophobia and lachrymation, still remained, but under the use of the yellow ointment and occasional applications of bluestone gradually diminished, so that by the end of June the patient was nearly well.

Another case in which the iodine-vasogen did excellent service was the following:

Max Z., aged eight, came in March, 1902, with an annular ulcer which, starting in the periphery of the cornea, ran in the course of three or four days three-quarters of the way round the corneal circumference, and also spread rapidly towards the centre. Carbolic acid, applied at the outset of the trouble, had failed to arrest the progress of the trouble, and, besides causing intense pain, had produced very disagreeable local reaction. He was put into the hospital, and the galvano-cautery was applied by Knapp's method of peripheral punctate cauterization. This arrested the process, and in sixteen days he was discharged. From time to time after this he had attacks of recurrent irritation at the site of the cicatrices. These attacks in general yielded readily to atropine and hot applications. In the end of May, however, he had an attack which did not subside under these measures. After it had lasted a week the infiltration began to spread, and it was evident that the condition was becoming worse. Two applications of iodine-vasogen (10 per cent.) served to arrest the process and effect a complete cure.

Besides the 15 ulcerative cases above mentioned, the iodine-vasogen was applied in 2 cases of pannus with apical infiltration and ulceration. In these it produced no special good effect.

It was also used in one case of corneal opacity in a one-year-old child to promote absorption. The effect here was apparently no greater than that of the yellow-oxide ointment.

Finally it was used as a stimulant application in one case of uveitis anterior with intense parenchymatous infiltration

of the cornea and a very soft eye (T — 2). Soon after the treatment was initiated, improvement commenced; the corneal infiltration, which had for a long time remained in statu quo, resolving, and the tension gradually coming up to normal. This may, of course, have been coincident only, and not cause and effect; but the coincidence was striking enough to make me feel disposed to try the same remedy in a similar case, as soon as one presents itself.

METHOD OF APPLICATION.—The application was made with a cotton-tipped probe. As the iodine-vasogen mixes freely with the tears and then tends to spread over the eye, it was found useful to mop up the tears with dry cotton wound on the other end of the probe until the eyeball was nearly dry, before making the application.

In scarcely any case was it found necessary or even advantageous to use cocaine or any other anæsthetic on the cornea before making the application.

The applications were usually made every other day in acute cases, and at longer intervals when the process of infiltration was subsiding.

REACTION PRODUCED.—The application usually caused immediate pretty marked ciliary injection, particularly when the eyeball was already much congested.

No untoward local effects of any kind were ever produced by the applications, even when made with considerable freedom.

Excluding one case which was seen only once, there were 18 cases upon whom 72 applications were made. As far as could be ascertained, only 11 of these applications, and that in 3 cases only, caused severe pain or pain of any duration.

In one case (that of uveitis anterior above cited), the cause of the pain seemed to be an aggravation of the already intense anterior conjunctival injection. Out of 8 applications 5 were painful. In another (that of Annie F., also cited above), the pain was caused probably by over-free application and by the fact that owing to the profuse lachrymation the application could not well be limited. Nevertheless, even here not more than 3 out of the total of 10 applications caused more than moderate or momentary pain.

In a third case, in which 5 applications were made, 3 caused decided pain, lasting for two or three hours.

In 3 other cases (8 applications) my notes do not state whether pain was present or not. The presumption is that there was none of any account, since I was on the lookout for this very symptom, and would, therefore, in all probability have noted it if present.

In the remaining 12 cases none of the applications (41 in all) caused anything more than a moderate pain, lasting at most only a few minutes and often only a few seconds.

CONCLUSIONS.—The impressions that I have gathered from the cases treated are these:

(*a*) Iodine-vasogen is a valuable application in infiltrated and spreading ulcers of the cornea, whether associated with purulent conjunctival secretion or not. It is particularly indicated in those cases in which the galvano-cautery is contra-indicated by the situation of the infiltrate.

(*b*) It rarely causes pain, if not applied in excess, and never causes any unpleasant reaction or untoward effects.

(*c*) Preliminary anæsthetization of the cornea with cocaine is rarely required, and in general is better omitted.

(*d*) The application is best made every other day until the infiltrate begins to shrink decidedly, and then should be made every three or four days until the infiltrate disappears.

ALBUMINURIC RETINITIS IN SYPHILIS.[1]

By Dr. C. ZIMMERMANN, Milwaukee, Wis.

A healthy-looking man, aged thirty, came to me Oct. 7, 1889. He was working very hard in editing a directory and noticed, since Oct. 3d, that his sight failed. V R = 15/50; V L = 15/40; V. F., color perception normal. *Ophth.:* Optic neuritis in both eyes and the characteristic aspect of albuminuric retinitis. Optic discs hazy, outlines ill-defined, small hemorrhagic and white streaks radiating from the disc towards the periphery, then come zones of large radiating hemorrhages along the blood-vessels and between more or less large white patches, the largest less than the size of the disc. Especially at the macular region are numerous small white patches in the well-known stellar arrangement. Veins enlarged, tortuous, and interrupted by exudations. No opacities of vitreous. Urine pale, specific gravity 1010; contains considerable albumen, although the patient did not complain of his kidneys; no sugar. No œdema or affection of heart. He had a hard chancre five years ago, then a general syphilitic exanthema, and afterwards an eruption on right leg. His wife had a stillbirth about that time and has had no children since. The *diagnosis* was made retinitis albuminurica, due to syphilis, and the patient put at once under energetic mercurial treatment and diaphoresis. October 16th, improved, reads newspaper print easily. Urine, 2000, contains less albumen. Nov. 9th, new hemorrhages in both eyes around the optic disc, but V not impaired. Nov. 26th, hemorrhages almost absorbed, but still some white patches. V = 15/15 each. Dec. 5th, hemorrhages all absorbed, the patient feels excellently well and resumes his work. Urine still contains some albumen. March 22d, 1890, he came again, on account of a scratch of his right eye. *Ophthalmoscope:* R at upper temporal margin of optic disc a black pigmented crescent as remnant of the larger hemorrhages he had

[1] Read before the Milwaukee County Medical Society, July 11, 1902.

had there, and a similar one in the left eye in lower portion of fundus. All other hemorrhages are absorbed in both eyes, and even the white patches disappeared, except at the macula lutea of the right eye where some white stellate dots are left, but much less in number. V = 15/15. Urine still contains some albumen. He feels very well and can do his work ever since without interruption. July 10, 1892, V = 15/10 in each eye. He looks extremely healthy and had not the least trouble. I did not see the patient any more, but, when looking up his case and inquiring about his address, I found that he had died Nov. 22, 1897. In the death certificate degeneration of the heart muscle was given as the cause of death, and, from the physician who treated him last, I learned that the patient, who habitually drank considerable quantities of beer, was sick only for about three weeks. He had œdema and albuminuria, which were considered as simply due to disturbance of circulation, not to nephritis.

The heart affection may have been of a syphilitic nature, and the albuminuria a manifestation of a relapse of syphilis, which would be one of the best arguments of the really syphilitic nature of the kidney affection.

Considering the speedy recovery of the ocular affection and the restoration of perfect vision, the first question will be: Was this really albuminuric retinitis, or was it not rather syphilitic retinitis, since a similar ophthalmoscopic condition, as described above, may not only occur in retinitis albuminurica, but also (Laqueur) occasionally in syphilis, as well as in some other affections (diabetes, gout, anæmia)? The stellate figure at the macula lutea, so often met with in albuminuric retinitis, is also found in syphilitic neuroretinitis, neuritis from brain tumor, and in retinal hemorrhages of young people. Haab thinks it is perhaps a general phenomenon of intense vascular disease with interference of retinal circulation, and rather caused by accumulation of fat-granule cells in the layer of the radiating cone-fibres (Dimmer) than by fatty degeneration of the inner ends of the supporting fibres of the retina, as formerly believed. But still there were some characteristic features in favor of albuminuric retinitis: the simultaneous and almost equal affection of both eyes, the preponderance and size of white

patches and their appearance at a certain distance from the disc, the streaky hemorrhages all over and their radiating arrangement. Hemorrhages in syphilitic retinitis are rather rare, and have a different shape, are not radiating, but punctated or occur in patches, generally in a sector of the fundus, supplied by a particular blood-vessel which shows pathologic changes, perivasculitis or is transformed into a white line. White foci are rare and, if met with, are smaller and round and spread over the whole retina, as described by H. Knapp, or form whitish bands or are more yellowish, and opacities of the vitreous often accompany the affection. Also in clinical respects there are differences: While our patient complained more of a general amblyopia, as usually in albuminuric retinitis, in syphilitic retinitis V is, as a rule, more deteriorated; central scotoma, defects of the visual field and impairment of light sense, micropsia and metamorphopsia are common occurrences, and the eyes are generally not affected at the same time, or at least in different degrees, and relapses are frequent. Although the diagnosis of albuminuric retinitis was at once confirmed by the presence of albumen in the urine, the patient had not the pale appearance generally found at the stage of nephritis complicated by the retinal affection. On the contrary, he looked very healthy, so that other etiological moments were searched for than genuine nephritis, and were found in the syphilitic infection. The subsequent history of the case corroborated this assumption. The patient lived yet eight years and apparently died from a relapse of syphilis, while the duration of life in genuine nephritis, especially in a man who habitually exposes himself to the noxious influences of large quantities of beer, scarcely lasts two years after the diagnosis of albuminuric retinitis is established.

How are the kidneys influenced by syphilis? Since, as ophthalmologist, I have no sufficient personal experience in that respect, I shall briefly report from the recent investigations of Welander, Karvonen, Greene, Justus, Doederlein, Hoffmann, and others, where also the older literature will be found. Although Rayer, as early as 1840, has called attention to a causal connection between albuminuria and

syphilis, these conditions have been more thoroughly studied only in the last two decennia. Some authors are not convinced of an occurrence of syphilitic nephritis, while others plead for it quite strongly. And the remark of Karvonen (*Dermatolog. Zeitschr.*, 1900) seems very reasonable: "As we know of no infectious disease which is never complicated by nephritis, why should the kidneys remain intact during syphilis." Justus (*Jrl. of Cut. and Gen. Ur. Dis.*, 1898) observed a striking agreement in the percentages of cases in investigations made in widely different times and countries. Among 250 syphilitic patients treated by him, he found albuminuria in the course of treatment twenty-two times (9.2 %), Fuerbringer 8 %, Welander among 280 cases fourteen (8 %), Petersen among 200 cases seventeen (13 1/2 %). In 4 cases of Welander (*Arch. f. Derm. und Syph.*, vol. 37, 1896) albuminuria set in three years after syphilitic infection, in 1 after six, eight, ten, eleven, twelve, sixteen, and twenty years respectively, and in 1 after forty years. In none of these cases W. had reason to assume any other cause but the syphilitic infection, as all, except 2, showed concomitant symptoms. Doederlein (*Muench. med. Woch.*, 1896) considers affections of the kidneys in syphilis as a relatively frequent occurrence, and thinks that the small number of cases in secondary syphilis is due to the fact that albuminuria has not been noticed on account of lacking symptoms, and that the severe and fatal cases are taken for independent nephritides.

From all descriptions it transpires that albuminuria may occur at all periods of syphilis, and the syphilitic affections of the kidney may assume all kinds of changes of these organs we know: parenchymatous, interstitial nephritis, granular atrophy, amyloid degeneration, and gummata. Virchow found in several cases of syphilis unilateral and partial atrophy; Weigert, the same with arteritis obliterans; Dieulafoy, large white kidneys with degeneration of epithelia and small-celled infiltrations around the tubuli and glomeruli; Engel-Reimers (*Monatsch. f. pract. Dermat.*, 1892), opaque swelling and fatty degeneration of the cortical epithelia, glomerulitis with hemorrhages, round-cell accumulations

around the glomeruli, and obliteration at some places. In all these cases syphilis existed over half a year, so that some irreparable changes were found. Doederlein observed interstitial changes. Welander feels not able to say, from his own investigations, whether chronic parenchymatous nephritis may be caused by syphilis, but he thinks, with the majority of authors, that interstitial nephritis may be due to syphilis. On account of its slow development, it very often causes no symptoms except minimal albuminuria, which therefore may be proven only at times. Hoffmann (*Berl. klin. Woch.*, 1902) recently described a case of acute syphilitic nephritis præcox with immense albuminuria (7 %), but very scanty sediment of some hyaline casts, leucocytes, very few red blood corpuscles and kidney epithelia, which exclude a hemorrhagic or parenchymatous inflammation. He assumed an alteration of the blood-vessels of the kidney, especially the glomeruli, rendering them permeable for the albumen, not the cell elements of the blood, and a changed condition of the blood, so that its albumen grew more easily diffusible. According to Karvonen, in some cases primary syphilitic arteritis seems to be the first cause of granular atrophy; in older cases it is, however, difficult to decide whether the vascular affection was really luic or arterio-sclerotic, or perhaps due to amyloid-hyaline degeneration. Welander and Karvonen explain the action of syphilis by an intoxication through the products of metabolism of the (hypothetic) syphilitic bacteria. But even if syphilis should not cause a kidney affection, it seems very probable that a pre-existing nephritis may be aggravated by syphilitic infection. The variety of findings set forth shows that, save gummata, there is no specific habitus from which the diagnosis of syphilitic nephritis could be made. It is always a diagnosis of probability. As pointed out by Justus, the first condition in stating that an affection, slight or serious, of the kidney is the result of syphilis, is that the patient be proven to have had healthy kidneys before infection; the second, that the symptoms of kidney disease must have run their course with the other syphilitic manifestations; and the third, that the changes in the urine should be improved or cured by mer-

curials. Points one and two very often are not available as we frequently do not see the patient until after the infection, and the syphilitic affection of the kidneys may, as in our case, occur without other syphilitic symptoms, so that we have to rely, besides the history, on the therapeutic test alone.

If after this digression we return to the chief point of interest in our case, the retinal affection, and consult literature, it is asserted by Karvonen that albuminuric retinitis in syphilis of the kidneys has been observed only exceptionally, but that it would certainly lead too far, if the luic etiology of every atrophic kidney in which later on albuminuric retinitis developed would be denied. Ziemssen (*Congress f. i. Med.*, 1885), namely, found several times albuminuria combined with syphilis, but these, not numerous, cases treated by him for lues, always took such a course that the ophthalmologists, who examined them all ophthalmoscopically, pronounced them as genuine cases of albuminuric retinitis not due to syphilis. In a particular case this diversity of opinions between Ziemssen and Pagenstecher also arose between Gerhardt and J. Michel. Groenouw (*Graefe-Saemisch*, 2d Ed.) mentions, with regard to albuminuric retinitis in syphilis, that luic affections of the kidneys may occur, but that in undoubtedly existing syphilis the nephritis must not necessarily be of a specific nature. We have learned above that all kinds of kidney affections may be caused by syphilis including such as notoriously may be complicated by albuminuric retinitis, as granular atrophy, large white kidneys, amyloid degeneration. There is no reason why these affections, if caused by syphilis, might not give rise to albuminuric retinitis. The diminution of albuminuria and the speedy recovery of the retinitis in our case through mercury showed beyond doubt such a causal connection with syphilis. This brings us to the question as to the mode of treatment of syphilitic nephritis and to the prognosis. While the experience of Senator is not in favor of mercurials, most authors concur in an energetic mercurial treatment. It is a well, known fact that the elimination of mercury through perfectly healthy kidneys may act as an irritation and may produce cylindruria and albuminuria, but Welander saw

these always disappear after a few weeks. An aggravation of an existing kidney trouble may, however, take place and may end fatally. Therefore at the clinic of Professor Lesser at Berlin the treatment is commenced with half doses of mercury, and Welander advises to carefully control the condition of the kidneys by repeated microscopical examinations of the sediment, as, from individual predisposition, the action of mercury varies very much in different persons (similar to the occurrence of stomatitis). Besides, the regular treatment of nephritis is not to be neglected. Since, according to Karvonen, the changes occur in foci which are not so pronounced, a complete recovery seems probable, at least in the lighter initial stages. No restitution is to be expected in more advanced cases, in which larger portions of the secreting parenchyma are destroyed and the supplanting fibrous tissue thwarts any treatment. Thus in twelve cases of Welander the albuminuria persisted. The diminution of albuminuria in our case by antisyphilitic treatment renders it likely that reparable and irreparable changes existed simultaneously.

The prognosis of syphilitic nephritis is certainly much better than in genuine nephritis, but must be guarded, just as the prognosis of syphilis in general, as earlier or later relapses are not excluded.

As to the treatment of albuminuric retinitis, Goldzieher (*Therapie der Augenkrankh.*) denounces, under all circumstances, mercury and large doses of iodine preparations. The cases he saw most rapidly terminating fatally were those in which by inexperienced physicians the disease was misunderstood or considered as syphilitic and "customarily" treated with mercurial inunctions. Also Groenouw, for the reasons mentioned above, thinks that inunctions might be harmful. It is a well established experience, that affections of the optic nerve (frequently found in albuminuric retinitis, as in our case) grow worse under inunctions. The brilliant result of the mercurial treatment in our case—and this is an important point—demonstrates not only the correctness of the diagnosis but also the expediency of specific treatment of albuminuric retinitis in syphilis.

REPORT OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

By Mr. C. DEVEREUX MARSHALL.

THURSDAY, JUNE 12, 1902. DAVID LITTLE, M.D., F.R.C.S., PRESIDENT, IN THE CHAIR.

Secondary carcinoma of the eye.

Dr. Rockliffe (Hull) read notes of the termination of his case exhibited to the Society in July, 1901.

The left eye was excised on July 12th, when it was found that the anterior part of the eye was quite healthy. The vitreous had disappeared. Situated at the posterior part and extending from the optic nerve to the ciliary processes was a large, flat, unpigmented tumor about 3 *mm* thick at the nerve and tapering in thickness as it went forward. It split the choroid which covered it on each side. The retina was completely detached. Microscopically the growth is seen to be in the choroid; it is unpigmented, and presents an appearance similar to that of the primary growth in the breast. The optic nerve and sclera are also infiltrated with tumor cells. On July 30th the vision was $\frac{6}{18}$. The detachment had increased and there were shooting pains around the eyeball. On August 16th she had an attack of pleurisy, and later stiffness and swelling of the left leg. The disc was congested, and the retina more swollen and detached. The patient died on November 30th, being much troubled with vomiting and coughing and her vision got worse, but she had little or no pain in the head or eye. To sum up, it would appear that secondary carcinoma of the eye more usually follows injury to the breast, affecting females rather than males between the ages of forty and sixty, and that the tumor is flat and consequently the tension is not increased, and that the duration of life, although varying after

the first symptom of the eye becoming affected, does not exceed two years.

Mr. HOLMES SPICER said he had recently seen a patient whose breast was removed two and a half years ago. She had two separate detachments of the retina, but the tension was not raised. The eye was removed, and a flat growth was found in the choroid quite separate from the retina.

Mr. HILL GRIFFITH thought that the flat appearance of these growths was not peculiar to them, but that if sarcomata were seen in a very early stage they also would be flat.

Mr. DEVEREUX MARSHALL thought that the disease was probably not so rare as one would imagine. So often it happens that when a patient is in an advanced stage of cancer the fact that the eye shows signs of failure is not taken much notice of, and doubtless many cases are missed in this way. He quite agreed with Mr. Hill Griffith that in very early cases of sarcoma the growth was flat, and he had seen such, but the whole tendency of these metastatic growths in the eyeball was to extend sideways and not to grow forward like a sarcoma, and really in this respect the two were never much like each other.

Dr. ROCKLIFFE also read notes of a case of **leprous ulcer of the cornea** in a young man, a native of the West Indies. He exhibited prints of skiagrams showing the various bone changes taking place in this disease; he also referred to the obstinacy of the corneal ulcer to treatment in spite of frequent galvano-cauterization, etc.

Dr. ROCKLIFFE also read notes of a case of supposed death from **atropine poisoning.** The patient was a very delicate-looking child, aged ten months, who had suffered from convulsions most of this time. He first of all put in 3 drops of a 1 % solution of atropine in the eyes, which did not dilate the pupils fully. More atropine was applied, but during the thirty hours which elapsed from the first using of the atropine only 7 drops were used. The temperature rose to 105.6°. The pulse was uncountable and the respirations 72; the skin was red and the lips had a quantity of mucus about them. In this state the child died.

Dr. BRONNER (Bradford) read notes on two families with **bilateral congenital microphthalmos and cataract.** In one case the father and four out of eight children were affected; these were numbers 3, 5, 6, and 8. The eyes of the mother

were normal. There was no consanguinity nor history of syphilis.

In the other case the mother and all the four children were similarly affected. The parentage of the children was somewhat uncertain. The mother of the woman is said to have had similar eyes.

Dr. ARGYLL-ROBERTSON had once operated on a boy with this condition, the father having similar eyes and having previously undergone a successful operation for the removal of his cataract. In both fair vision resulted.

Mr. MULES thought that in such cases there was usually congenital syphilis.

Mr. PRIESTLEY SMITH said there was no hard and fast line to be drawn between a small eye and a microphthalmic one. If the diminished size was very marked, probably the lens was small and opaque; but if the lens was clear and full-sized, then glaucoma was almost certain to result. On the whole, he thought that the former variety were less liable to become blind than the latter.

Mr. FROST thought that those having a congenital coloboma were less liable to glaucoma.

Prof. Fuchs had seen but one case. In this a man who had lost an eye from acute blennorrhœa had a child who suffered from microphthalmos on the same side.

Dr. BRONNER replied.

Colloid degeneration of the conjunctiva.

Major HERBERT, I. M. S., described a case of what has been wrongfully named "amyloid" or "hyaline" degeneration. Similar changes have been found rarely in the skin of old people, and have been correctly described by dermatologists as "colloid" degeneration. The ocular conjunctivæ only were affected, the palpebral portions being occupied by scar tissue from old trachoma; a swollen translucent fold overhung the upper third of each cornea.

The change consisted mainly in a swelling and breaking up and rearrangement of white connective-tissue fibres (collagen) and also of elastic fibres. In the deeper tissue the new material became moulded into rounded and elliptical blocks, probably by constant stretching and movement of the fold. In the centre of many of these folds plasma cells were enclosed, more rarely small

masses of colloid or masses of blood pigment. Other blocks with central cavities represented the remains of blood-vessels. On the other hand, other blood-vessels had undergone rarefaction of their walls instead of colloid thickening and occlusion. Many of the blocks had connective-tissue cells closely applied to them. Special staining with acid fuchsin and acid orcein showed embedded in many of the blocks the remains of white connective tissue fibres and in others elastic fibres. But the change was so advanced in the tissue examined that it was only close beneath the epithelium, in a layer of adenoid tissue, that the transition from collagen to colloid could be followed. In this layer a few true hyalin balls were to be found, and both here and in the deeper tissue many golden pigment granules, the remains of hemorrhages, were seen. Here and there some of the deeper colloid had coalesced into large and rather firm opaque waxy masses, 2 or 3 *mm* or more in diameter. In the central portions of these masses there were no blood-vessels and only the remains of cells, consisting of groups of small particles and larger spheres with some affinity for hæmatoxylin. There were still a few bands of white connective tissue remaining, but they were degenerating on lines rather apart from the primary colloid change; also some free elastic fibres, mostly clumped near blood-vessels. Some of the latter showed basophile degeneration — elacin. The only approach to amyloid reaction found was a faint indigo blue with iodine and sulphuric acid in a few of the blocks; all alike stained pale brown with iodine alone, and none of them gave any trace of pink with methyl and gentian violet.

The following card specimens were shown:

Major M. T. YARR: Indirect contusion injuries of the left eye, resulting in blindness following a Mauser bullet wound of both superior maxillary regions.

Mr. J. R. PARSONS: Sections of a case of microphthalmos.

Dr. LESLIE BUCHANAN: Traumatic separation of the ciliary body from the sclera.

Mr. STEPHEN MAYON: (*a*) Rodent ulcer of the face treated by X-rays. (*b*) Case of trachoma treated by X-rays.

Mr. ARNOLD LAWSON: Partial embolism of the central artery of the retina in a lad aged eighteen.

Mr. HOLMES SPICER: (*a*) Thrombosis of retinal veins with cystic degeneration of the retina and yellow spot. (*b*) Vessels of new formation on anterior surface of iris.

THURSDAY, JULY 3, 1902. CHARLES HIGGINS, F.R.C.S., VICE-PRESIDENT, IN THE CHAIR.

A case of **detachment of the retina in which complete recovery took place.**

The Chairman read notes of this case, which occurred in a lady aged thirty-six, who had been under his care for myopia of high degree since 1892. In 1899 she nearly lost the sight of the left eye from detachment of the retina.

In May, 1901, she first noticed an obscuration of the upper part of field in the right eye. There was a doubtful history of injury some weeks before. The lower part of the retina was found detached. She was treated for nearly a month by lying down, with mercurial inunctions and vapor baths; some improvement took place. A fortnight later, the sight suddenly returned one afternoon while lying down, and it was as good as it had been before the detachment occurred. Ophthalmoscopically some vitreous opacities were seen, but no detachment. On January 23, 1902, nearly nine months later, the vision was $\frac{6}{24}$ and Ji, and the field was almost normal, and there was no sign of detachment.

Notes on a case of **retinal detachment after cataract extraction.**

Mr. ERNEST CARTWRIGHT read this paper. The patient was a man aged seventy-two, whose right eye had been operated on for cataract in 1899, and this was subsequently needled twice. In April, 1900, the vision was with correction $\frac{6}{9}$ and Ji.

On January 7, 1901, he was again seen, and he stated that two weeks ago the right eye had suddenly failed and everything looked tinted red. The sight had got gradually worse since, so that he could now only count fingers at 6′. The left eye had a complete cataract with good projection. His heart and urine were normal.

He was kept in bed, and a scleral puncture was made above, behind the detachment; some clear watery fluid exuded.

He was discharged on January 25th without improvement.

He was seen from time to time with gradual improvement until in September, 1901, when he could see $\frac{6}{18}$ and Jii. The field was nearly normal. The left cataract was then extracted, and with this he could see $\frac{6}{9}$ and Ji, while the other improved to $\frac{6}{12}$ and Ji.

Mr. MACLEHOSE mentioned a case he had seen due to a blow, which had recovered.

Mr. HARTRIDGE stated that he had never seen a case which had got well.

Mr. JESSOP had never seen a case of complete recovery, though he had seen several in which temporary improvement had taken place.

Mr. DEVEREUX MARSHALL also stated that he had seen more than one apparent cure, but that all those he had been able to trace had subsequently recurred.

Mr. SYDNEY STEPHENSON described a method of operating on cases of **convergent squint** by cutting the tendon in such a manner that the out edges could be applied together and the muscle could be lengthened to the required degree. He had operated on six cases with gratifying results.

The following card specimens were shown:

Mr. J. H. PARSONS: (1) Gumma of ciliary body. (2) Metastatic carcinoma of the choroid. (3) Annular sarcoma of the ciliary body.

Mr. DOYNE: Rupture of the eyeball, with prolapse of iris and without dislocation of the lens.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE FOURTH QUARTER OF THE YEAR 1901.

By Prof. ST. BERNHEIMER, at Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin;

WITH THE ASSISTANCE OF

Dr. G. Abelsdorff, Berlin; Prof. E. Berger, Paris; Dr. Dalén, Stockholm; Dr. J. Herrnheiser, Prague; Prof. Hirschmann, Charcow; Dr. J. Jitta, Amsterdam; Dr. Krahnstöver, Rome; Mr. C. Devereux Marshall, London; Dr. P. von Mittelstädt, Metz; Prof. Da Gama Pinto, Lisbon; and others.

Translated by Dr. Ward A. Holden.

Sections I.–III. Reviewed by Professor HORSTMANN.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

519. **Groenouw** and **Uhthoff.** The relations of general diseases and organic diseases to affections of the eye. *Graefe-Saemisch Handbuch*, 2d edition, Leipsic, Engelmann, 1901.

520. **Marchand.** The process of the healing of wounds, including transplantation. From *Deutsche Chirurgie*, Stuttgart, Enke, 1901.

521. **Greeff.** Historical remarks on the invention of the ophthalmoscope. *Berl. klin. Wochenschr.*, 1901, No. 48.

522. **Laborde.** An oculist of the twelfth century. Bienvenu of Gerusalem and his work, the manuscript of the library at Metz. *Thèse de Montpellier*, 1901.

523. **Karewsky.** The work of the ophthalmic service in the Glasow Department of Wjatka in May, 1901. *Wratsch*, 1901, No. 45. (4202 patients, 3695 of whom had trachoma.)

524. **Sotin.** The work of the ophthalmic service in the Wiledkischen Department, June 15th to August 1, 1900. *Wjest. Ophth.*, 1901, No. 6. (3592

patients, including 1013 cases of trachoma, 104 incurably blind, 1073 operations.)

UHTHOFF (519) describes in detail the ocular changes in poisoning with alcohol and some seventy other substances, and GROENOUW describes the relations of diseases of the skin and motor organs, constitutional anomalies, and general disturbances of nutrition to the eye.

We should not neglect to call the attention of our readers to the important work by MARCHAND (520) on the healing of wounds. No one who is interested in general biological questions should fail to read this book. After an historical introduction on the doctrine of the healing of wounds from Hippocrates to Cohnheim and Lister he describes the various manners in which wounds may heal — direct union, regeneration, healing under a crust, and primary and secondary healing. The inflammation which often occurs is regarded by Marchand as an advantageous process, contrary to general opinion. In the development of new tissue it is not to be assumed that the leucocytes themselves are transformed into connective-tissue cells; they break down and the regeneration of connective tissue takes place only from connective tissue already present. It is doubtful whether endothelial cells also form connective-tissue fibrillæ.

For the ophthalmologist, the chapter on the healing of corneal and scleral wounds is of special interest. Marchand does not agree with Krückmann that the small part taken by the sclera in its regeneration depends upon its poor vascular supply, since the non-vascular cornea repairs itself.

Corneal wounds are filled first with a fibrinous layer. Marchand agrees with Greeff that the fibrin, which is wanting in normal aqueous humor, is secreted by the ciliary processes. Yet he does not agree with Greeff in believing that primary changes in the epithelium precede the entrance of fibrin into the aqueous, but he supposes a primary nervous reflex process causing hyperæmia and inflammation as the cause of the fibrinous secretion. Recent investigations do not permit the reviewer to accept Marchand's views.

The chapter on transplantation of the cornea is extensive and describes the author's own experiments, which on the whole are encouraging. He found that a transplanted flap might heal and retain complete transparency, so that he does not share the pessimistic views of Sulzer. GREEFF.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

525. **Kymowitsch.** The bacillus of acute contagious conjunctivitis (bacillus Koch-Weeks), and its relation to the influenza bacillus (bacillus Pfeifferi). *Russ. Archiv f. Path., klin. Med. u. Bacteriol.*, 1901.

526. **Kymowitsch.** On the significance of the symbiosis of bacteria in the infection of the conjunctival sac. *Ibid.*, 1901.

527. **Schanz.** On Behring's latest diphtheria theory. *Münch. med. Wochenschr.*, 1902, No. 2.

528. **Naito.** Pathological investigations on the condition of the ciliary nerves, and on amyloid and hyaline degeneration in phthisis bulbi. *Graefe's Archiv*, liii., p. 1.

529. **Sandmann.** Changes and diseases of the eye in pregnancy, labor, and lactation. *Münch. med. Wochenschr.*, 1901, p. 1073.

530. **Lederer.** On traumatic enophthalmus and its pathogenesis. *Graefe's Archiv*, liii., p. 241.

531. **Strzeminski.** A contribution to the question of the existence of ocular syphilis in the third generation. *Graefe's Archiv*, liii., p. 360.

532. **Duboys de Lavigerie.** Double microphthalmus. *Bull. de la Soc. d'opht. de Paris*, 1901, No. 5.

533. **Cordiale.** A case of microphakia. *Ann. d'ocul.*, cxxvi., p. 346.

534. **Sulzer.** On a unit of measurement of acuteness of vision. *Ibid.*, p. 455.

535. **Puech.** On the value of an ocular examination in the diagnosis of certain forms of hereditary syphilis. *Arch. d'opht.*, xxi., 11, p. 709.

536. **Lagrange.** Orbital heteroplasty by grafting the eye of a rabbit into the capsule of Tenon. Remote result. *Ann. d'ocul.*, cxxvi., p. 369.

537. **Heine.** On orthostereoscopy. *Graefe's Archiv*, liii., p. 306.

538. **Jackson.** Thrombosis of the cavernous sinus. Double panophthalmitis of septic origin. *Phil. Med. Journ.*, Sept. 28, 1901.

539. **Barck.** Two cases of bilateral homonymous hemianopsia. *Amer. Journ. of Ophth.*, Oct., 1901.

540. **Bane.** Herpes zoster ophthalmicus with brief report of five cases. *Journ. Amer. Med. Assoc.*, Dec. 21, 1901.

Various comparative bacteriological investigations and experiments on animals have led KYMOWITSCH (525) to the following conclusions:

1. The bacilli found in the secretion of acute conjunctivitis and in the sputum of influenza are morphologically identical. 2. The conditions of growth on various media and the appearance of the cultures are absolutely similar. Each of these micro-organisms placed in the same conditions goes through the same forms of development. Both have the same tendency to symbiosis with the same particular micro-organisms. 3. The effect of each on the animal organism is exactly similar. Both are toxic without producing a general infection.

The writer concludes that the bacillus of acute conjunctivitis and the bacillus of influenza are the same, producing in the respiratory tract influenza and in the conjunctival sac acute conjunctivitis. The acute conjunctivitis caused by the Koch-Weeks bacillus is therefore an influenza of the eye. HIRSCHMANN.

SCHANZ (527) states the fact that the xerosis bacillus regularly found in the conjunctival sac is identical with the Loeffler pseudo-diphtheria bacillus. Both are distinguished from the true diphtheria bacillus by the lack of toxicity. In order that a true diphtheria may develop, there must be the causative agent, a disposition of the mucosa brought about by climatic or other conditions, and also certain other conditions.

According to NAITO (528) it is probable that in atrophic eyes new formation of nerve trunks can take place, when perhaps the ciliary nerves in the interior of the eye are in any way divided. Histologically it is hard to confirm the proliferation. But one can safely say that there is a proliferation of medullated fibres in the cornea. In a phthisical stump a great quantity of nerves that have not degenerated can be found, the increase being due probably to the mechanical irritation. In fact the number of intraocular nerves in a phthisical stump may be very great and out of all proportion to the other remaining tissues. It is, therefore, possible to believe that not only a recurrent inflammation but also a mechanical irritation may give rise to pain when cicatricial bands form in a ball so rich in nerves.

SANDMANN (529) describes the affections of the eye in pregnancy, the lying-in period, and lactation. The prognosis as regards vision is bad in albuminuric retinitis, particularly when the retinitis comes on early and is associated with vascular changes. Abortion should be induced quickly in these cases. The most frequent complication is detachment of the retina. All of the 12 cases previously reported were cured. Transitory uræmic amaurosis is due primarily to the toxin. Metastatic ophthalmia is distinctly unfavorable as regards vision, but some cases are reported in which the patient lived. Repeated examinations of 126 pregnant and recently confined women failed to reveal the changes in the discs described by Bosse in a recent number of these ARCHIVES.

According to LEDERER (530), traumatic enophthalmus is the result of injury of the orbital margin. The injury leads to a direct

or indirect fracture of the orbital wall. This leads to hemorrhage into the orbital tissues with cicatricial formation, which leads to retraction of the eyeball. The accessory symptoms of traumatic enophthalmus are due to simultaneous lesions of particular orbital structures from hemorrhages or fragments of bone, or from the involvement of neighboring structures in the cicatrization of the fracture in the orbital wall.

Duboys de Lavigerie (532) observed bilateral microphthalmus of high degree in a girl of seven. The left eye was photophobic. Berger.

Cordiale (533) describes a case of bilateral microphakia which he examined in Tscherning's laboratory. By Jackson's method of skiascopy he found a positive spherical aberration in both eyes — 11 D in the right and 3.8 D in the left, which, since the cornea was not abnormal, was referred to the lens. The results obtained with the phakometer must be studied in the original paper. The microphakia of the right eye was explained as being due to a failure of development of the lens, while that of the left was thought to be due to the fact that the entire eye though otherwise normal was not fully developed. Berger.

Sulzer (534) discusses the question of the uniform designation of acuteness of vision, and thinks the smallest angle under which the test object can be recognized better than the diameter of the object. As regards the designation of the visual angle he prefers the division of the quadrant into 100° (decimal system) instead of 90° (Chaldean system). The former has been adopted by the French War Office and will be discussed at international meetings.

In Puech's (535) cases the onset of a parenchymatous keratitis revealed the hitherto unsuspected syphilitic nature of inflammations of the knee joint and treatment was successful.

In 27 cases of parenchymatous keratitis from hereditary syphilis, affections of the joints were found in 11, most frequently in the knee, and sometimes in the elbow. The diagnostic value of parenchymatous keratitis in these cases is considerable and under mercurials they improve. Iodide of potassium is of doubtful value.
v. Mittelstädt.

Lagrange (536) has taken up Chibret's procedure of transplanting a rabbit's eye into the human orbit. The experiment failed in but one case in 11. A photograph of the patient first operated on, fifteen months after, shows that the result obtained was permanent. Berger.

JACKSON (538) reports two cases as follows: Case 1. Male, twenty-six, with pulmonary tuberculosis, lids greatly swollen, some protrusion of the eyeball, with severe pain in the orbit. Diagnosis of gonorrhœal ophthalmia. The swelling increased, but there was very little restriction of the movements of the eye. Patient died suddenly and a thrombus was found in the right cavernous sinus. The clot was about $\frac{1}{8}$ in. in diameter and extended into the orbital vein. Case 2. Female, forty-five. The inflammation of the eyes began nine days before seen. The condition was found to be panophthalmitis in both eyes. The patient died of septic pneumonia. The source of septic poisoning was thought to be in the knee-joint, which was found filled with pus. ALLING.

III.—INSTRUMENTS AND REMEDIES.

541. **Szurow.** Dionin in ocular practice. *Wratsch*, 1902, No. 46.

542. **Bayer.** On the use of peroxide of hydrogen in medicine. *Correspondenzbl. d. Vereins deutscher Aerzte in Reichenbach*, 1902, No. 2.

543. **V. Sicherer.** Cuprol, a new agent for treating conjunctival inflammation. *Ophth. Klinik*, 1901, p. 353.

544. **Leprince.** A new method of preparing yellow-oxide salve. *Ann. d'ocul.*, cxxvi., p. 319.

545. **Reynolds.** The therapeutic value of adrenalin chlorid. *Ophth. Rec.*, Nov., 1901.

SZUROW (541) has used 11.5 % dionin solutions, also a 1 % solution after the instillation of atropine, and the yellow ointment containing 3.5 % of dionin. The results were very favorable in the various sorts of corneal disease. The destruction of the cornea was checked, healing was promoted, and to a certain extent the clearing up of opacities was favored. Dionin proved of especial service in mycotic corneal ulcers with hypopyon. In iritis it was used with advantage together with atropine. In affections of the deeper parts of the eye dionin had no effect. It never produced complete anæsthesia for the removal of foreign bodies. It always causes œdema of the conjunctiva, and therefore is contra-indicated in the more important eye operations.

HIRSCHMANN.

BAYER (542) has used peroxide of hydrogen for seventeen years and recommends it as a hemostatic in lid operations, enucleations, and extirpations of the lachrymal sac. In all fresh injuries of the lids or eyeball, he uses a 3 % solution exclusively for cleansing purposes. Its disinfecting properties are of great service in the early

stages of corneal ulcer. The fine white foam that arises after the instillation cleanses the ulcer mechanically better and with less danger than wiping it off with moist cotton pledgets. It acts well in removing the crusts of blepharitis ciliaris. Its use in a wet dressing proved too irritating to the delicate skin of the lid.

HERRNHEISER.

According to LEPRINCE (544), freshly prepared, still moist, precipitated yellow oxide should be rubbed up with lanoline, not vaseline, in a porphyry mortar. BERGER.

According to REYNOLDS (545), adrenalin will relieve ciliary pain in all forms of keratitis, iritis, and even cyclitis. It will also reduce intraocular tension and clear up interstitial opacities of the cornea. He has found it useful in diseases of the lachrymal apparatus. ALLING.

Sections IV.–VII. Reviewed by DR. G. ABELSDORFF, Berlin.

IV.—ANATOMY.

546. **Asayama.** On the anatomy of the ligamentum pectinatum. *Graefe's Archiv*, liii., 1, p. 113.

547. **Levinsohn.** On the relations of the nerve terminations in the extrinsic muscles of the human eye. *Ibid.*, 2, p. 295.

548. **Landolt.** Lindsay Johnson's ophthalmoscopic researches and their significance from the view-point of comparative anatomy. *Arch. d'opht.*, xxi., p. 716.

ASAYAMA (546) has made new investigations of the structure of the ligamentum pectinatum in a series of normal human eyes. The chief part of the ligamentum pectinatum consists of layers of plates which consist of broad and thin columns between which are clefts and spaces. Each column is formed of fine fibres held together by a glassy homogeneous substance. The fineness of the fibres increases with age. The fibrous structure is not very marked in the new-born. The meshwork is denser posteriorly than anteriorly. The portion next the anterior chamber consists of cylindrical columns everywhere equally thick.

LEVINSOHN (547) has found that there are two sorts of nerve endings in the extrinsic muscles in man. First, the nerve fibres terminate in end plates as in the reptiles and mammalia; second, the nerve fibre breaks up into a great number of terminal branches before reaching the end plate, all being within a Henle's sheath. The course of these fibres is not always direct; frequently they

curve about one another, or turn about the muscle before entering it at an acute angle.

V.—PHYSIOLOGY.

549. **Nagel.** The effect of santonin on color vision, particularly the dichromatic. *Zeitschr. f. Psychol. u. Physiol. d. Sinnesorgane*, xxvii., 4, p. 267.

550. **Hess.** Entoptic perception of the venæ vorticosæ. *Graefe's Archiv*, liii., 1, p. 52.

551. **Hess.** Remarks on the doctrine of after-images and complete color blindness. *Arch. f. Augenheilk.*, xliv., 3, p. 245. (A criticism of Nagel's observations on a case of complete color blindness, p. 153.)

552. **Hering.** On the projection of stereoscopic pictures for demonstration. *Arch. f. d. ges. Physiol.*, 87, p. 229.

553. **Nagel.** On the location of the pain from glare. *Klin. Monatsbl. f. Augenheilk.*, xxxix., p. 879.

554. **Lange.** The normal width of the pupil according to measurements in the policlinic. *Inaug. Dissert.*, Amsterdam, 1901.

555. **Grasset.** Disturbances of orientation and of equilibrium. Paris. Felix Alean, 1901.

556. **Grasset.** Vertigo; a physio-pathological study of the function of orientation and equilibrium. *Rev. philosophique*, March–April, 1902.

557. **Ellis, F. W.** Studies in the physiology and psychology of visual sensations and perceptions. *Amer. Journ. of Physiology*, Aug., 1901.

NAGEL (549) has studied the effect on his own vision of the ingestion of santonin. natr. 0.5. He found a paralysis neither of the red nor of the violet components. The short-waved colors of the spectrum appeared unchanged, while the long-waved appeared whitish if seen in a very small field on a dark ground, but unchanged on a white ground. When dark surfaces were looked at, a violet glow appeared. This combined with small fields of long-waved light on a dark ground rendered the latter white. The origin of the white perception of red or yellow light is similar to that brought about in dichromatic eyes by a mixture of blue and red. Nagel believes that the disturbance of color vision in santonin poisoning is due not to a paralysis but to an excitation of the visual organ causing violet perception. An analogous but transitory condition of excitation was produced in his own eye by looking at a bright surface or the clear sky for 10 seconds and then looking at small colored fields on a dark ground through the ocular of a color-mixing apparatus. Red and yellow then appeared to him nearly white, while the background apparently had taken on a bluish color, *i.e.*, the action of diffuse white light causes in the green blind a condition of excitation manifesting itself in blue vision.

HESS (550) has studied the appearance of light just described by Bell, which comes on in forced expiration and particularly in sneezing. While Bell believed the contraction of the lids to be the cause of the phenomenon, Hess shows that it is independent of the opening or closing of the lids, and is more evident when the head is bent forward. Then a light spot appears in the upper-outer, upper-inner, lower-outer, and lower-inner quadrants of the field. The absolute location and the distance apart of the spots lead Hess to believe that they represent an excitation of the retina at the seat of the venæ vorticosæ. The increased tension in the veins is supposed to cause the mechanical excitation of the retina.

NAGEL (553) has verified in a measure the view of v. Frey that the pain in glare from intense light depends upon the contraction of the iris, by finding that when his own eye contained homatropin pain was not caused by glare but the reflex closure of the lid persisted.

In Straub's clinic LANGE (554) measured 1000 pupils of persons of different ages and sex. The examinations were made by direct and lateral illumination and the width of the pupil in artificial light was controlled with an apparatus especially devised by him.

The results were as follows:

1. The size of the pupil differs greatly in different persons.
2. Women have larger pupils than men.
3. The "physiological width" of the pupil decreases with age.
4. The width of the pupil is less in hyperopia than in emmetropia.
5. The width of the pupil decreases with the degree of the hyperopia.
6. The physiological width in myopes is up to the twentieth year greater than in emmetropes.
7. With increasing age the difference in the size of the pupil with different states of refraction is less marked, and after the age of forty years it is inconsiderable.
8. With reduced illumination the differences enumerated under 3-7 are greater and remain well marked up to the sixtieth year.

JITTA.

GRASSET (555), in his two valuable papers, discusses the disturbances of equilibrium in a manner interesting to the ophthalmologist and the neurologist alike. He describes the anatomy

and physiology of the association tracts between the eye and the cerebellum, the destruction of which leads to optical vertigo. The papers are not such as can be given in abstracts.

BERGER.

ELLIS (557) conducted a series of experiments with the stroboscope bearing on the question of the duration of visual sensations after momentary light impressions. Under favorable conditions he found the durations of such sensations about $\frac{3}{4}$ second, and the duration is only slightly affected by variation of the intensity of color of the light employed. After very brief illumination of the retina, if the field remains perfectly dark and the light sufficiently intense, the primary image is followed by an after-image of very slight intensity with a distinct period of darkness intervening between the two. Such conclusions seem to indicate that the duration of the visual sensations is longer and less affected by the character of the stimuli than has hitherto been supposed.

ALLING.

VI.—ERRORS OF REFRACTION AND ACCOMMODATION.

558. **Bargy.** Experimental researches on ametropes from anomalies of corneal curvature. *Thèse de Lyon*, 1901.

559. **Steiger.** Acuteness of vision and astigmatism. *Arch. f. Augenheilk.*, xliv., supplementary number, p. 15.

560. **Gullstrand.** The constitution of the pencils of rays refracted in the eye. *Græfe's Archiv*, liii., 2, p. 185. A general treatment of the doctrine of monochromatic aberration, with its applications to refraction in the eye.

561. **Meyerhof.** Myopia operations in the Bromberg eye clinic. *Arch. f. Augenheilk.*, xliv., 2, p. 135.

562. **Koster.** The operative treatment of myopia. *General Session of Oculists of the Netherlands at Leyden*, 1901.

563. **Hoor.** On so-called school myopia. *Owas Természettudomanyi*, 1901.

564. **Weiss.** The condition of accommodation in stereoscopic vision. *Arch. f. d. ges. Physiol.*, 88, p. 79.

565. **Dabroslawin.** The influence of the condition of the accommodative apparatus of the eye on the curvature of the cornea. *Wratsch*, 1901, No. 44.

STEIGER'S (559) examinations of 440 boys and 500 girls lead to the conclusions that perverse astigmatism, even of low degree, reduces vision considerably. In astigmatism according to the rule up to 1.75 D, the vision in early life is usually good, so that correction is required less for deficient vision than for subjective disturbances. In unilateral astigmatism, the vision is usually more reduced than in bilateral of the same degree, and is less fully corrected with glasses.

MEYERHOF (561) reports the myopia operations done by Augstein, in Bromberg. Twelve patients had one eye operated upon and 9 had both. The age ranged from nine to thirty-eight years. There was no infection in any case, but in 2 detachment of the retina quickly followed the operation. Furthermore, in 2 other patients the retina became detached from trauma three or four years after the operation. In the remaining cases a considerable improvement in vision was obtained.

KOSTER (562) prefers to operate for myopia on one eye only. He advises operation on both eyes only when both eyes have good mobility, are about equally myopic, and have binocular vision. He discusses the various complications. In 15 cases operated on by him there was no detachment of the retina. In 1 case there was iridocyclitis, and in 2 cases secondary glaucoma followed discission. JITTA.

HOOR (563) does not agree with the new view that myopia is more frequent to-day than formerly. The important factor in its production, he believes, is heredity and predisposition, and he rejects the idea of school myopia.

WEISS (564), by observing the images of two luminous objects reflected from the anterior surface of the lens, found that when the gaze was changed from far points in stereoscopic pictures to nearer ones, the state of accommodation was altered; the size of the reflexes from the lens and their distance apart became less. But since the increase in convergence through the stereoscopic parallax, which may be computed, takes place without a necessary increase in accommodation, the increase in accommodation indicated by the change in the lenticular images would seem to be due to an impulse toward corporeal projection. The fact that the stereoscopic images do not suffer in distinctness from the change in accommodation is explained on the ground that the accommodation is immediately relaxed again.

DABROSLAWIN (565) photographed the corneal images of rabbits after the use of atropine, eserine, and in the normal state. Comparison of these photographs proved undoubtedly that the radius of corneal curvature was less in conditions of accommodative spasm, and differed with different states of accommodation.
HIRSCHMANN.

(As regards its visual apparatus, the rabbit is low down in the mammalian scale, and it has seemed to the translator that experi-

ments on rabbits' eyes generally are more frequently than not misleading when their results are assumed to hold good for the human eye. The rabbit's cornea, as is generally known, is relatively thinner and much less resistant than the cornea of man.)

VII.—MUSCLES AND NERVES.

566. **Imbert.** Internal deformities of the vitreous humor during movements of the eyeball. *Arch. d'opht.*, xxi., p. 467.

567. **Westphal.** On the Westphal-Piltz pupillary phenomenon. *Berl. klin. Wochenschr.*, 1901, p. 1226.

568. **Delamare.** Parascleral strabotomy. *Rec. d'opht.*, xxiii., p. 641.

569. **Lagrange.** Congenital ophthalmoplegia. *Mém. et bull. de la soc. franç. d'opht.*, p. 309, 1901.

570. **Terson, Albert.** Traumatic paralysis of the inferior oblique. *Arch. d'opht.*, xxi., p. 514.

571. **Axenfeld** and **Schürenberg.** Contributions to the knowledge of congenital defects in the mobility of the eye. *Klin. Monatsbl. f. Augenheilk.*, xxxix., p. 844.

572. **Péchin** and **Allard.** Facial paralysis and lateral associated movements of the eye on the same side. Electrical examination. *Bull. de la soc. de neurol. de Paris*, July 4, 1901.

573. **Bull, G.** The field of relative convergence. *Mém. et bull. de la soc. franç. d'opht.*, 1901, p. 414.

574. **Nuel.** Paralysis of the sixth nerve as the only symptom of a traumatic rupture of the carotid artery in the cavernous sinus. *Arch. d'opht.*, xxi., p. 765.

575. **Jackson.** The treatment of strabismus other than by operation. *Jour. Amer. Med. Assoc.*, Oct. 26, 1901.

576. **Davis, A. E.** Strabismus. *Ibid.*, No. 2, 1901.

577. **Bordley.** A new-formed physiological macula. *Ophth. Record*, Oct., 1901.

IMBERT (566) studied the change in location of an opacity of the vitreous in his own eye while his gaze was changed slowly or rapidly from one point of fixation to another. He found that when the eye was turned slowly the opacity maintained the same relative position in the field, but that when the movement of the eye was rapid, displacements occurred within the vitreous itself, more marked in the periphery than near the centre.

v. MITTELSTÄDT.

WESTPHAL (567) rejects Schanz's explanation of a purely mechanical action in the narrowing of the pupil when the lids are closed, and also the idea of Kuhne's that possibly the pupillary phenomenon is caused by excitation of the sensory nerves of the

ball, because the instillation of cocaine does not diminish the contraction. The author considers the idea of an associated action the most plausible.

DELAMARE'S (568) new method of strabotomy consists in the section of the tendon midway between its point of insertion and its entrance into the muscle. The advantage lies in the greater effect obtained. The usual strabotomies are efficacious when the deviation is not over 2 *mm*, but this operation may be employed successfully when the deviation in the adult is 3–6 *mm*. The procedure is illustrated in two schematic drawings.

LAGRANGE (569), in a case of congenital paralysis of both external recti found also a bilateral paralysis of the upper twigs of the facial nerve, which the author explains by the close relation assumed by Duval between the nucleus of the sixth nerve and the upper nucleus of the facial nerve. BERGER.

TERSON'S (570) patient, a boy of thirteen, had received a severe blow against the lower orbital margin, causing a fracture of the bone, with great swelling of the neighboring tissues, which by pressure on the nerve or muscle had caused an isolated paralysis of the inferior oblique, with typical diplopia. While the traumatic paralyses of cerebral origin rarely are recovered from, this paralysis soon passed off. The existence of paralysis completes the complexus of symptoms of the affections following contusions or fractures of the orbital margin, such as exophthalmus, enophthalmus, or lesions of the optic nerve. V. MITTELSTÄDT.

AXENFELD and SCHÜRENBERG (571) describe: (1) A case of congenital defect in upward movement of the eyes in a girl of ten, whose eyes were directed downward. In advancing the left superior rectus, a well-developed muscle was found inserted at the normal place. On the right side, the tendon of the rectus inferior involved one third of the circumference of the eyeball, and after dividing it and advancing the superior rectus, there was no active mobility upward, but the ball assumed nearly a horizontal position.

(2) In a boy of eighteen, with parallel position of the eyes and complete lack of abduction in the left eye, they found, after incision of the conjunctiva, in place of the left external rectus a yellowish-gray elastic band attached to the sclera. (3) Three cases of congenital paralysis of the abducens and rotation of the ball in adduction. In two of these cases, direct inspection revealed a

tough tendinous band in place of the external rectus muscle, and in but one case was there convergent strabismus. In one case the band taking the place of the abducens was so tense that the fixation to the outer side was sufficient to explain the retraction in adduction, but in the others an abnormal insertion of the internal rectus (a retractor) was assumed; this was indicated by the absence of retraction when the ball was passively adducted with forceps.

PÉCHIN and ALLARD (572) observed in a hysterical patient of forty-six a left peripheral facial paralysis and inability to move the two eyes to the left. This functional disturbance was thought to be due to a lesion (tubercle) in the region of the corpora quadrigemina. BERGER.

BULL (573) uses the stereoscope to measure the field of relative breadth of convergence, in which he distinguishes a zone of esophoria, one of orthophoria, and one of exophoria. For the patient it is of importance to have a zone of orthophoria as great as possible. In case this is not obtained by means of spherical glasses or prisms, operative measures must be resorted to.

BERGER.

NUEL'S (574) patient was a boy of fourteen, who had been injured near the middle of the left lower lid by a steel umbrella rib which penetrated into the orbit. The cerebral symptoms at first present quickly passed off. After the swelling of the lids had disappeared, complete paralysis of the external rectus was discovered. There were no evidences of pulsating exophthalmus, and no dilatation of the veins about the eye, and vision was normal. The patient suddenly died in an apoplectic attack. At the autopsy, hemorrhage was found on the base of the skull, particularly of the left side, and in the lateral ventricles. Furthermore, there was a small venous aneurysm communicating with the posterior wall of the cavernous sinus by a slit-like opening. On opening the dilated sinus, the atrophic sixth nerve was seen behind it. The carotid was forced forward and downward, and exhibited a rupture three *mm* in diameter, through which the artery communicated anteriorly with the spongy tissue and posteriorly with the sinus. The ophthalmic vein at its point of entrance appeared to be closed by the compressed spongy tissue. Thus there was no pulsating exophthalmus, which would probably have developed had the carotid been wounded in the anterior wall alone.

Rupture of the carotid in the cavernous sinus can arise from contusion of the region about the eye, can heal, but can also cause sudden death. In the present case the paralysis of the external rectus was the only symptom of the injury to the vessel. Paralysis of the external rectus after contusion of the skull is not necessarily, as is generally believed, due to a fracture of the apex of the petrous bone, but may also be caused by a rupture of the carotid in the cavernous sinus. V. MITTELSTÄDT.

JACKSON (575) emphasizes the value of correction of refractive errors in treatment of squint. He advocates exclusion of the better eye by pad or by use of a cycloplegic, together with exercise for the development of binocular vision such as the stereoscope and bar-reading. ALLING.

DAVIS (576) reports thirty-four cases operated upon by the method of Panas by stretching the muscles before cutting, and recommends the procedure as safe in execution, quick in results, and efficient. ALLING.

BORDLEY (577) describes the case of a young lady who, after a double tenotomy for convergent strabismus, got divergence in the right eye. The right eye could not be made to fix with the macula, but normal vision was obtained with a false macula, while the eye was in divergence, and binocular fixation was shown to exist by all tests. ALLING.

Sections VIII.–XII. Reviewed by DR. R. SCHWEIGGER, Berlin.

VIII.—LIDS.

578. **Voerner.** On sycosis parasitaria ciliaris (Trichophytia ciliaris). *Klin. Monatsbl. f. Augenheilk.*, xxxix., p. 871.

579. **Weber, F.** A case of chancre of the upper lid. *Arch. f. Augenheilk.*, xliv. Ergänzungsheft, p. 173. (To be translated.)

580. **Wagenmann.** Noma of the eye (symmetrical gangrene of the lids and the region of the lachrymal sac). *Deutsche med. Wochenschr.*, 1901, No. 31.

581. **Vix.** A case of symmetrical gangrene of the lids and region of the lachrymal sac. *Inaug. Dissert.*, Jena, 1901.

582. **Roger** and **Weil.** Benign gangrene of the lids. *Presse méd.*, Paris, Sept. 21, 1901.

583. **Osborne.** Trichiasis operations. Ophthalmic reports. *Arch. f. Augenheilk.*, xliv., 2, p. 105.

584. **Oppenheimer, E.** On the treatment of senile ectropium. *Deutsche med. Wochenschr.*, No. 21, 1901.

585. **Salomonsohn.** On the treatment of entropion and of ptosis. *Ibid.*, No. 50, p. 883, 1901.

586. **Adjemian.** Restoration of the lids by a cutaneous flap. *Arch. d'opht.*, xxi., 12, p. 779.

587. **Marie.** On a special form of primary progressive myopathy with bilateral ptosis and participation of the masticator muscles. *Rec. d'opht.*, xxiii., p. 572.

588. **Marlow.** Noma of the eyelids in an infant. *Ophth. Record*, Dec., 1901.

589. **Weymann.** The pathogenetic eventuations of chalazial tumors. *Annals of Ophth.*, Oct., 1901.

In a man with parasitic sycosis of the beard, VOERNER (578) found on the brow and upper lid a swelling 3–4 *mm* high, of red color and dense consistency, with some pustules corresponding to hair follicles. The lower lid also exhibited similar but smaller efflorescences. The conjunctiva was normal. Lashes pulled out of the sycosis nodules had their roots covered with a dense thready mass, which in cultures proved to be the Trichophyton ectothrix. A sulphur salve and other applications led to recovery in two weeks.

The case of noma reported by WAGENMANN (580) and described in more detail by VIX (581) occurred in an infant six weeks old and otherwise healthy. An ulcer, 2 *cm* deep and 2 *cm* in diameter with a discolored base, occupied the region of the right lachrymal sac, the root of the nose, and both lids, and encroached upon the conjunctiva and sclera. On the left side the same process began in the skin of the region of the sac. Energetic treatment, internal and local, failed to check the process. But after four weeks' duration it began to improve when from weakness, anæmia, and broncho-pneumonia the infant died.

Bacteriologically only bacilli were found, which were not diphtheritic. The process was regarded as due to ectogenous infection through the skin.

In Egypt OSBORNE (583) frequently sees cases of curvature of the tarsus and trichiasis after trachoma, and for the relief of the condition he prefers Snellen's excision of the tarsus to all transplantation methods. The effect is regulated not by the amount of skin and muscle excised, but by the angle of the excised portion of tarsus and the position of the sutures. Osborne employs this method as a prophylactic in cases threatening trichiasis.

In treating senile ectropion, OPPENHEIMER (584) fixes a spring

extension to the spectacle frames, which rests on the lower lid and holds it in position. This is analogous to the ptosis spectacles with a spring passing upwards which SALOMONSOHN (585) describes.

Under the above title MARLOW (588) describes the case of an infant which, when a week old, showed a pimple on the upper lid. This formed an ulcer which led to the complete destruction of both upper and lower lids. When the child died, three months later, the cavity left by the ulceration had begun to cicatrize.

ALLING.

IX.—LACHRYMAL APPARATUS.

590. **Fromaget.** Tumors of the lachrymal glands. *Arch. d'opht.*, xxi., 11, p. 726.

591. **Polyak.** On probing the nasal duct from the nose. *Orvosi Hetilap.*, 1901, No. 52.

592. **Brandenburg.** On the precautionary removal of the diseased lachrymal sac. *Ophth. Klinik*, 1901, No. 18.

593. **Wygodsky.** On extirpation of the lachrymal sac. *Wjest. ophth.*, Nov.–Dec., 1901.

594. **Stieren, E.** Tuberculous dacryo-adenitis and conjunctivitis, containing the report of a probable case ending in spontaneous recovery, and a review of previous literature on tuberculous adenitis. *Bull. Johns Hopkins Hosp.*, Nov., 1901.

In FROMAGET'S (590) first case a tumor of the palpebral lachrymal gland removed from a man of twenty-four proved to be a myxo-fibrosarcoma.

In the second case a tubular epithelioma had developed from the glandular epithelium of the orbital lachrymal gland in a man of fifty-four.

In the third case a hydatid cyst had developed in the orbital gland in a woman of sixty-five. One portion of it, with bloody serous contents, lay in the muscle funnel, while the other portion, containing a clear watery liquid, had caused the complete disappearance of the gland. The author advises that these tumors always be removed through a cutaneous incision and not through the conjunctiva unless it is intended to eviscerate the orbit entirely.

V. MITTELSTÄDT.

POLYÁK (591), from his own experience, recommends probing the nasal duct from the nose. This method is indicated particularly in those cases in which the affection is recent and no marked

changes have developed in the wall of the sac, so that it is no longer capable of aspiration. The procedure is contra-indicated in cases of stenosis high up, and in cases of advanced changes in the wall of the sac, which cannot be cured even if the stenosis is relieved, and also naturally in children before the age of puberty, whose nasal passages are too narrow for the introduction of large instruments.

It is to be remarked that the procedure is very painful, and that the anterior end of the lower turbinate must be removed; for which reasons it is not likely that there will be much enthusiasm in regard to this new method of treatment. HERRNHEISER.

BRANDENBURG (592) calls attention to the high percentage of eyes in country dwellers which, after superficial injury of the cornea, are lost because of infection from the lachrymal sac. Only the radical removal or destruction of all diseased portions of the lachrymal sac can lead to recovery or prevent the sad results of the corneal injuries which occur so frequently.

WYGODSKY (593) considers extirpation of lachrymal sac indicated (1) in fistula of the sac, (2) in ectasia of the sac, (3) in cases of inflammation of the sac not yielding to milder methods, (4) in fresh inflammations of the sac when serpent ulcer develops, and (5) when an operation involving opening the ball is necessary while suppuration of the sac exists. Wygodsky prefers Kuhnt's method to the others. HIRSCHMANN.

STIEREN'S (594) case was a girl of thirteen, colored, with cough, night sweats, and loss of weight. There was swelling of both lachrymal glands and the conjunctiva of the upper lids was red, rough, and dotted with yellowish-gray nodules, some of which had broken down into ulcers. Under general treatment the health was restored and the eyes became normal. In spite of the fact that microscopic examination of the scraping of the ulcers and the inoculation of rabbits were negative, the diagnosis of tuberculosis seemed justified. ALLING.

X.—ORBIT AND ACCESSORY CAVITIES.

595. **Fiser.** On affections of the orbit. *Wiener med. Wochensch.*, 1901, No. 48.

596. **Stocker.** An unusual case of thrombosis of the anterior basilar sinus following orbital thrombophlebitis. *Arch. f. Augenheilk.*, xliv., Ergänzungsheft, p. 105.

597. **Weeks.** Abscess of the frontal lobe, accompanied by orbital cellulitis. *Ann. d'ocul.*, cxxvi., p. 66.

598. **Nikoljuckin.** A case of spontaneous recovery from an orbital echinococcus after erysipelas of the face. *Wjest. Ophth.*, Nov.-Dec., 1901.

599. **Stephan.** A contribution to the diagnosis of orbital echinococcus and the Krönlein operation. *Inaug. Dissert.*, Rostock, 1901.

600. **Parinaud** and **Roche.** Angio-fibroma of the orbit. Modification of the Krönlein operation. *Ann. d'ocul.*, cxxvi., p. 291.

601. **Morestin.** Two cases of extensive epithelioma of the face and orbit, operated on by Krönlein's method, XVI. *Congrès franç. de chirurgie*, Oct. 23, 1901.

602. **Ssytschew.** A case of osteoma of the orbit. *Wjest. Ophth.*, xviii., p. 534.

603. **Lukin.** A case of osteoma of the orbit. *Ibid.*, p. 434.

604. **Fejér.** Operation for retrobulbar myxosarcoma. *Arch. f. Augenheilk.*, xliv., 2, p. 124.

605. **Rollet.** Exophthalmus cured by malar orbitotomy. *Ann. d'ocul.*, cxxvi., p. 370.

606. **Knapp, Paul.** A case of pulsating exophthalmus. *Zeitschr. f. Augenheilk.*, vi., p. 461.

607. **Variot** and **Roy.** Exophthalmic goitre in an infant. *Bull. de la soc. méd. des hôpitaux*, Dec. 6, 1901.

608. **Knapp, Arnold.** Blindness following an operation for empyema of the frontal sinus. *Ann. d'ocul.*, cxxvi., p. 67.

609. **Conkey.** Hemorrhage into the orbit of a new-born child. *Ophth., Rec.*, Oct., 1901.

According to FISER's (595) statistics of the patients seen at the Laibach hospital 0.4 to 1.3 % of all eye diseases are diseases of the orbit.

Injuries of the orbit were frequent, but extensive hemorrhage rare. Small hemorrhages at the apex are frequently to be diagnosed from the injury to the optic nerve and do not cause changes in the position of the eyes. The therapy of orbital hemorrhage consists of diaphoretics and moist heat.

Phlegmon of the orbit, which may develop without injury, may proceed from an affection of the sac, which first infects the periosteum.

The bony wall may also transmit the suppurative process from the neighboring cavities. These inflammations often, without suppuration, cause considerable fever and general disturbance.

STOCKER's (596) patient, a few days after an injury near the left external canthus, had fever and exophthalmus on that side, where some small septic foci and probably also thrombo-phlebitis in the orbital veins had developed, extending through the other

sinuses to the right ophthalmic vein, causing within two days exophthalmus of the right side and some symptoms of brain pressure. After opening the left orbit to allow the escape of pus, the symptoms decreased.

The vision of the left eye failed gradually with the picture of simple optic-nerve atrophy, but the right eye regained normal vision and the general condition became good. The author believes that early and extensive incisions into the infected orbit are necessary to save life.

In NIKOLJUCKIN'S (598) case echinococcus of the orbit had been diagnosed, but the intended operation was deferred on account of an outbreak of erysipelas on the face and head. After recovery a watery liquid escaped from beneath the lower lid, and later a white dense membrane appeared, which the patient pulled out, it being as large as a hen's egg. The former good vision was lost during the erysipelas by detachment of the retina.

HIRSCHMANN.

PARINAUD and ROCHE (600) offer a modification of Krönlein's operation, in which the cutaneous incision forms an angle with its apex pointing backward.

For severe pain SSYTSCHEW (602) enucleated the blind eyeball which had been forced out of the orbit by an orbital tumor as large as a hen's egg. The pain ceased after the enucleation.

HIRSCHMANN.

FEJÉR (604) presents first a systematic description of orbital tumors, calling attention to the fact that internal treatment is to be employed first, even when the microscope reveals sarcomatous growth; there may be lymphadenoma which will yield to treatment, or dilated veins of a nature for which Krönlein's operation is too severe a method of attack.

In his own case, the author found in a child of nine a myxosarcoma of four years' duration, which was adherent to the periosteum at two points and, on account of its relations to the orbital fissures, could not be removed entirely. The tumor, which was as large as a walnut, had not only forced the eye forward but had dilated the orbit posteriorly.

ROLLET (605) reports a case of unilateral exophthalmus with optic neuritis, in which, suspecting a retrobulbar tumor, he made a digital exploration. Instead of opening the lateral wall by Krönlein's method, he made a temporary dilatation of the orbit

by forcing the superior maxilla downward. After incising the skin and using the chisel, as in resection of the superior maxilla, the bent finger was entered and the superior maxilla pressed downward. It was possible, without dividing the ocular muscles, to explore the entire orbit, and no tumor was found. After the operation the exophthalmus disappeared almost entirely, but the optic nerve became atrophic. The writer compares the effect of the explorative orbitotomy with that of exploratory laparotomy.

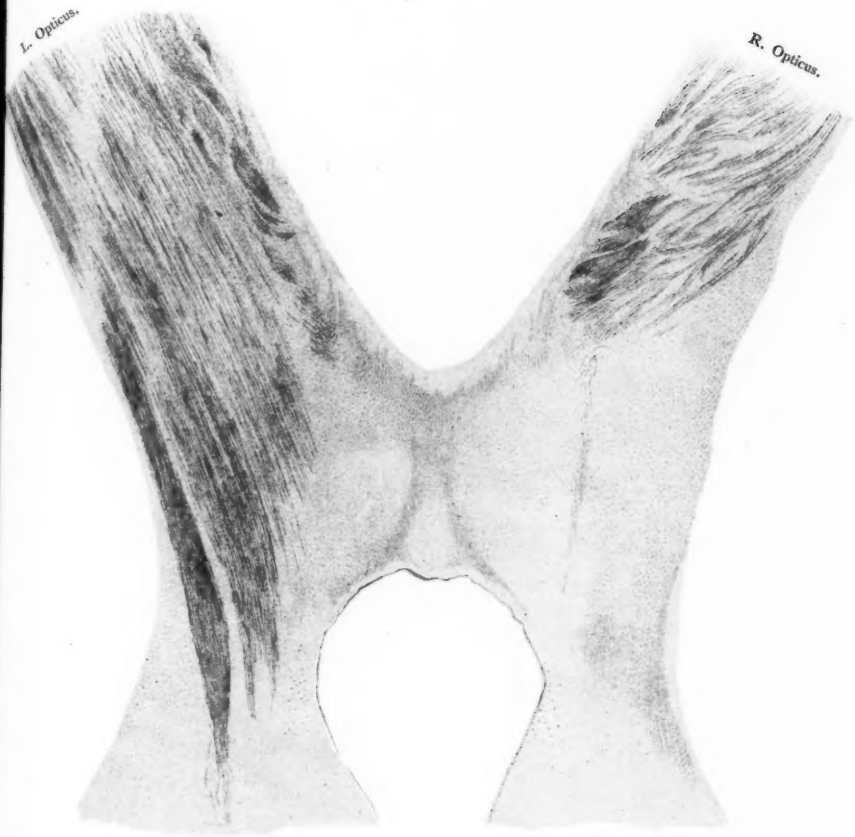
KNAPP'S (606) patient, after a trauma in the region of the right eye, presented exophthalmus of 8 *mm*, with evident pulsation, and audible whirring over almost the entire head. The carotid was ligated without influencing the exophthalmus, but stopping the whirring sound except for a slight relapse. But other unfavorable results of the ligation set in, the thrombosis of the internal carotid and cavernous sinus, extending to the retinal veins, causing dilatation of the veins with constrictions at various points, whitish foci, and extensive hemorrhages about the veins, which affected vision. The arterial supply of the eye remained unaffected. Knapp is now considering the ligation of the ophthalmic vein. The effect of the orbital venous network upon the ciliary ganglion is of interest; it first narrows the pupil, then dilates it irregularly, and almost completely paralyzes it, the iris becoming hyperæmic and tuberculous.

VARIOT and ROY (607) observed a case of Basedow's disease in a child four and a half years old. The exophthalmus, tachycardia, and swelling of the thyroid improved under thyroidin treatment. In the discussion, P. Marie spoke against this treatment. BERGER.

CONKEY (609) relates the case of a healthy child whose eyelids became distended with extravasated blood the third day after birth. On the fifth day there was marked exophthalmos in each eye. For the next ten days the exophthalmus steadily increased upon the right side, finally crowding the eye from the orbit. From that time the hemorrhage ceased and the eyes gradually receded. In addition to the hemorrhage from the orbit there was persistent oozing from the umbilicus and hæmaturia. The hemorrhage was probably subperiosteal, but it is difficult to assign a cause. ALLING.

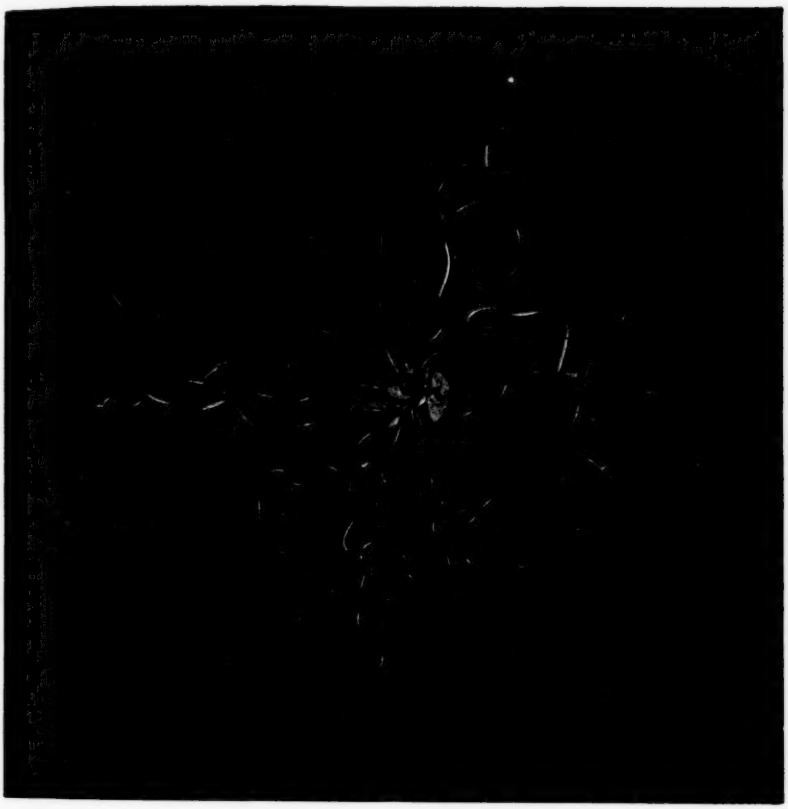
(*To be continued.*)

This is the plate which should have accompanied Dr. R. Schweigger's article, entitled "Ciliary Processes in the Pupillary Area," which appeared in No. 1, Vol. XXXI., of the ARCHIVES OF OPHTHALMOLOGY, page 24.



L. Tractus. R. Tractus.

VERLAG VON J. F. BERGMANN, WIESBADEN.



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